This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

UC-NRLF
$B 78 833

SIGILLVM · VNIVERSITATIS · CALIFORNIENSIS
FIAT LVX
MDCCCLXVIII
EX LIBRIS

BUILDING CODE

UNIV. OF
CALIFORNIA

INDUSTRIAL COMMISSION
OF WISCONSIN
1914

UNIV. OF
CALIFORNIA

INDUSTRIAL COMMISSION OF WISCONSIN

MADISON

C. H. CROWNHART, CHAIRMAN OF THE COMMISSION
J. D. BECK   PAUL J. WATROUS, SECRETARY   FRED M. WILCOX
SIDNEY J. WILLIAMS, DEPUTY IN CHARGE OF BUILDING INSPECTION

Issued Sept. 15, 1914

UNIV. OF CALIFORNIA

BUILDING CODE

INTRODUCTION.

Chapter 588, laws of 1913, contains the following provisions (sections 2394—41 to 2394—71):

> "Every employer and every owner of a place of employment or a public building now or hereafter constructed shall so construct, repair or maintain such place of employment or public building, and every architect shall so prepare the plans for the construction of such place of employment or public building, as to render the same safe." It shall be the duty of the Industrial commission "to ascertain, fix and order such reasonable standards, rules or regulations for the construction, repair and maintenance of places of employment and public buildings, as shall render them safe."
>
> "The term 'safe' or 'safety' as applied to an employment or a place of employment or a public building, shall mean such freedom from danger to the life, health, safety or welfare of employes or frequenters, or the public, or tenants, and such reasonable means of notification, egress and escape in case of fire, as the nature of the employment, place of employment, or public building, will reasonably permit."

M76413

TH224
W6A25
1914-27

> "The term 'public building' as used in sections 2394—41 to 2394—71 shall mean and include any structure used in whole or in part as a place of resort, assemblage, lodging, trade, traffic, occupancy, or use by the public, or by three or more tenants."
>
> "The term 'owner' shall mean and include every person, firm, corporation, state, county, town, city, village, manager, representative, officer, or other person having ownership control or custody of any place of employment or public building, or of the construction, repair or maintenance of any public building, or who prepares plans for the construction of any place of employment or public building. Said sections 2394—41 to 2394—71, inclusive, shall apply, so far as consistent, to all architects."

Existing laws on fire escapes, exits, etc., are repealed.

In accordance with this statute, a Building Code was formulated by the following committee:

A. C. Eschweiler, architect, Milwaukee.
C. F. Ringer, former Inspector of Buildings, Milwaukee.
Howland Russel, architect, Milwaukee.
C. A. Halbert, civil engineer, Railroad Commission.
Sidney J. Williams, deputy, Industrial Commission.

Valuable assistance was also received from the following:

George B. Ferry, architect, Chairman Milwaukee Building Code Commission.
Gustave Kahn, Sterling Engineering Co., member Milwaukee Building Code Commission.
W. D. Harper, Inspector of Buildings, Milwaukee.
Chief Thos. A. Clancy, Milwaukee Fire Department.
Van Ryn & DeGelleke, Milwaukee (schools).
Kirchoff & Rose, Milwaukee (theaters).
Milwaukee & Wisconsin Hotel Men's Associations and traveling men's organizations (hotels).
J. E. Florin, Supt. of Inspection, State Fire Marshal's Department.
J. R. Sullivan, Milwaukee Board of Fire Underwriters.
Geo. Sayle, Chairman, Board of Public Works, Madison.
F. L. Kronenberg, architect, Madison.
L. W. Claude, Claude and Starck, architects, Madison.
Chas. E. Marks, architect, Madison.
Philip Dean, Building Commissioner, Madison.
National Fire Protection Association, and scores of other architects, builders, fire chiefs, etc.

All of these gentlemen, and especially the original committee, have given very freely of their time to this work, for which the Industrial commission acknowledges its deep obligation. Copious use was made of the best existing municipal and state legislation, including the new Milwaukee ordinances prepared by the Milwaukee Building Code Commission.

The tentative code thus prepared was printed and sent to every architect and fire chief in the state, to commercial organizations, and to many other interested parties, both in and out of the state. The newspapers gave much space to the subject. Public hearings on the code were held in Superior, Eau Claire, Oshkosh, La Crosse, Janesville, Madison, and Milwaukee, which were attended by city officials, architects, builders, and property owners. In short every effort was made to secure publicity commensurate with the importance and far-reaching effect of a state building code. The criticism thus received, relating mostly to matters of detail, resulted in a revision of many sections of the code. After finally leaving the hands of the committee, the code was submitted to and approved by the Industrial commission's, general committee on safety and sanitation, composed of the following:

Representing Wisconsin State Federation of Labor:
  Geo. Mutter, machinist, Milwaukee.
  Fred French, patternmaker, Milwaukee.
Representing Milwaukee Merchants and Manufacturers' association:
  Charles P. Bossert, Pfister & Vogel Leather company.
  Edward J. Kearney, Kearney & Trecker company, chairman of committee.
Representing Milwaukee Health department:
  Joseph Derfus, chief sanitary inspector.
Representing Wisconsin Manufacturers' association:
  Thomas McNeill, Sheboygan Chair company, Sheboygan.
  H. W. Bolens, Gilson Manufacturing company, Port Washington.
Representing Employers' Mutual Liability company, Wausau:
  W. C. Landon, Wausau.
Representing Industrial Commission of Wisconsin:
  John W. Mapel, Pfister & Vogel Leather company.
  Fred W. McKee, Fairbanks-Morse company, Beloit.
  Ira L. Lockney, deputy to the Industrial commission.
  C. W. Price, assistant to the Industrial commission.

Purpose of the Code.

A state building code, if it is to be efficient without being unduly restrictive, must confine itself to broad general requirements of fire protection, sanitation, and structural safety. Technical details must be avoided except where they are needed to give meaning to the general requirement. In other words, the code should specify results only, giving free rein to the originality of the architect or engineer to secure such results by the most economical and efficient means. Even such matters of detail as are properly included in city building ordinances must often be excluded from the state code. This refers especially to details of engineering design, which it would be useless to include in a state code because they could not be enforced by local officials without technical training.

The experience of other states, where a multiplicity of detail in building laws has antagonized designers and defeated its own purposes, has proven that these dangers are real. The Wisconsin code has sought to avoid them.

It has been the especial aim of the framers of this code to include only such requirements as are based on actual experience and standard practice. The code is not put forth as an ideal standard of building construction, but simply as the best standard which can reasonably be enforced throughout Wisconsin at the present time. The desirability of such a code is indicated by the large loss of life through fire or panic in different parts of the country in recent years. The Iroquois theater fire in Chicago, the Collinwood school fire in Ohio, the Triangle Waist company fire in New York, to quote only the most prominent instances, have caused legislation along these particular lines, in their respective localities and elsewhere, which is much more drastic than the requirements here proposed. It is hoped that the moderate requirements of this code will prevent or at least minimize the possibility of such catastrophes in Wisconsin.

The code attempts to protect life by means which will at the same time protect property. Such protection is not a burden but a sound business investment.

Administration.

The building code will be enforced in co-operation with local officials, who are required by law to enforce all orders of the commission which are germane to their respective duties (Sect. 2394—70). With the state code as a foundation, city ordinances may go more into detail, if desired, or may contain more stringent requirements than those of the state code.

To secure the best results, plans should be filed with and approved by a city building inspector. This is now required in Milwaukee, Superior, and Madison, and for buildings within the fire limits in other cities. The Industrial commission strongly recommends all cities to require such building permits and thus prevent the construction of buildings which will endanger the lives of citizens and increase the possibility of a disastrous general conflagration.

When local permits are not required, the commission will be glad to examine any plans which may be submitted by architects or owners who wish to protect themselves against the possibility of having to make future changes to conform to the code. This is especially suggested in the case of theaters, schools, and other large buildings. If a building is erected in violation of the code, the owner may be required to correct the defect, and may also be held for a penalty of from ten to one hundred dollars for each day of violation.

Appeal.

Any person who considers any part of the building code, or any local official's interpretation of the code, to be unreasonable, may appeal to the commission to interpret, modify, or suspend the same. As the building code is not a statute but an administrative order of the commission, it may be so interpreted, modified, or suspended by the commission at any time. The subject of building design is so complex, and the situations which may arise are so various, that such exceptions will doubtless have to be made from time to time. The same procedure applies to the recognition of new building materials or systems of construction.

Bulletins.

Education is more potent than regulation. The building code, though regulatory in form, aims simply to present to the people of Wisconsin the accummulated experience of the state and the United States as to what precautions are necessary to make buildings reasonably safe. The commission intends to supplement this by issuing bulletins from time to time describing new developments in building design and construction, and also describing any important fires or collapses which occur. The commission believes that every owner wants to make his building as safe as possible and that he only asks to be shown what safeguards have been proven necessary by experience.

TABLE OF CONTENTS.

BY PAGES

Part I. Scope of Building Code.

Section 1 New Buildings and Additions, 9.
Section 2 Alterations, 9.
Section 3 Change of Use, 9.
Section 4 Existing Buildings, 9.
Section 5 Buildings not Included, 10.
Section 6 Local Regulations, 10.

Part II. Definitions and Standards.

Section 1 Fireproof Construction, 11.
Section 2 Mill Construction, 12.
Section 3 Ordinary Construction, 13.
Section 4 Frame Buildings, 13.
Section 5 Height of a Building, 13.
Section 6 Basement: First Floor: Number of Stories, 13.
Section 7 Incombustible Roof Covering, 14.
Section 8 Street, Alley, Court, 14.
Section 9 Standard Fire Stops, 14.
Section 10 Standard Exits, 16.
Section 11 Standard Fire Ladder, 26.
Section 12 Standard Standpipes, Fire Extinguishers, and Sprinklers, 27.

Part III. General Requirements.

Section 1 Design and supervision of buildings, 30.
Section 2 Height and Class of Construction, 31.
Section 3 Floor Areas, 32.
Section 4 Windows and Courts, 33.
Section 5 Toilet Rooms, 34.
Section 6 Boilers, Furnaces and Stoves, 37.
Section 7 Smoke Pipes, 39.
Section 8 Steam Pipes, 39.
Section 9 Hot Air Pipes and Registers, 40.
Section 10 Chimneys, 40.
Section 11 Lights, 42.
Section 12 Electrical Work, 42.

Part IV. Structural Design.

Section 1 Floor and Roof Loads, 43.
Section 2 Wind Pressure, 45.
Section 3 Foundations, 46.
Section 4 Masonry Construction, 46.
Section 5 Concrete Construction, 50.
Section 6 Steel and Iron Construction, 52.
Section 7 Wood Construction, 53.

Part V. Factories, Office and Mercantile Buildings.

Section 1 Classification, 56.
Section 2 Exits, 56.
Section 3 Scuttle, 60.

Note on Elevators and Elevator Enclosures.

Section 4 Trap Doors and Floor Openings, 60.
Section 5 Lighting, 60.
Section 6 Standpipes, Fire Extinguishers, and Sprinklers, 61.
Section 7 Fire Alarm, 62.
Section 8 Notice of Loads and Persons Accommodated, 62.

Part VI. Theaters and Assembly Halls.

Section 1 Classification, 63.
Section 2 Height and Class of Construction, 63.
Section 3 Exposure and Courts, 65.
Section 4 Buildings Used for Other Purposes, 66.
Section 5 Capacity, 67.
Section 6 Stairways and Other Means of Ingress, 67.
Section 7 Emergency Exits, 68.
Section 8 Exit Doors, 70.
Section 9 Seats, 70.
Section 10 Aisles and Passageways, 71.
Section 11 Scuttle, 71.
Section 12 Elevators, 71.
Section 13 Proscenium Wall and Curtain, 72.
Section 14 Stage: Ventilator, etc., 73.
Section 15 Work Shop, Storage and General Property Rooms, 74.
Section 16 Dressing Rooms, 74.
Section 17 Boiler and Furnace Rooms, 75.
Section 18 Heating and Ventilating, 75.

Section 19 Lights, 75.
Section 20 Toilet Rooms, 77.
Section 21 Fire Protection, 77.
Section 22 Mirrors: False Openings, 79.
Section 23 Motion Picture Machines and Booths, 79.

Part VII. School Buildings, Libraries and Museums.

Section 1 Classification, 82.
Section 2 Height and Class of Construction, 82.
Section 3 Exposure and Courts, 83.
Section 4 Subdivision and Fire Stops, 83.
Section 5 Exits, 83.
Section 6 Scuttle, 85.
Section 7 Elevators, 85.
Section 8 Rooms and Windows, 86.
Section 9 Assembly Halls, 87.
Section 10 Seats, Desks and Aisles, 87.
Section 11 Boiler and Furnace Rooms, 87.
Section 12 Ventilation, 88.
Section 13 Toilet Rooms, 88.
Section 14 Standpipes and Fire Extinguishers, 89.
Section 15 Fire Alarm, 89.

Part VIII. Apartment Houses, Hotels and Places of Detention.

Section 1 Classification, 90.
Section 2 Height and Class of Construction and Fire Stops, 91.
Section 3 Yards, 92.
Section 4 Courts and Shafts, 92.
Section 5 Exits, 92.
Section 6 Lights, 94.
Section 7 Scuttle, 95.
Note on Elevators and Elevator Enclosures.
Section 8 Rooms and Windows, 95.
Section 9 Boiler and Furnace Rooms, 95.
Section 10 Ventilation, 95.
Section 11 Toilet Rooms, 96.
Section 12 Standpipes and Fire Extinguishers, 96.
Section 13 Automatic Sprinklers, 96.
Section 14 Fire Alarm, 97.
Section 15 Directions for Escape, 97.
Alphabetical Index, 98

PART I.

SCOPE OF BUILDING CODE

SECTION 1. NEW BUILDINGS AND ADDITIONS.

Order 5000. This code shall apply to all new buildings and additions (except those exempted in order 5006) for which contracts have not been let before October 15, 1914.

SECTION 2. ALTERATIONS.

Order 5001. This code shall apply to all alterations which affect the structural strength, fire hazard, exits, lighting or sanitary condition of any building (except those exempted in order 5006) for which contracts have not been let before October 15, 1914. This does not include ordinary repairs necessary for the maintenance of any building.

SECTION 3. CHANGE OF USE.

Order 5002. This code shall apply as far as possible to all buildings which are to be devoted to a new use for which the requirements of this code are in any way more stringent than the requirements covering the previous use of the building.

SECTION 4. EXISTING BUILDINGS.

Order 5003. Obstruction of Aisles, Exits, etc.—All provisions of this code relating to the obstruction of aisles, corridors, passageways, doors, fire escapes, stairways, and other means of egress shall apply to existing buildings as well as to new buildings.

Order 5004. Fire Escapes.—The specifications for fire escapes, fire ladders, and standpipes, contained in orders 5121–5135, shall apply to all fire escapes hereafter constructed on existing buildings as well as on new buildings.

> **Note.** General orders covering the **number** and **size** of fire escapes required on existing buildings will be drawn

up by the Industrial commission in the near future. In the meantime, special orders will be issued where necessary.

Order 5005. Miscellaneous. Every new installation, and every repair exceeding 50 per cent, of any

Roof covering
Toilet room
Boiler, furnace, or stove
Chimney or smokepipe
Motion picture machine or booth

shall comply with the corresponding requirements of this code.

See also Orders 5001, 5002.

SECTION 5. BUILDINGS NOT INCLUDED.

Order 5006. This code does not apply to the following buildings:

(1) Private residences, and outbuildings in connection therewith, such as barns, garages, etc.

(2) Flat buildings used as the residence of two families only, provided not more than six persons are accommodated who are not members of the family.

(3) Buildings used for agricultural purposes which are not within the corporate limits of a city or village.

(4) Temporary buildings or sheds used for construction purposes only.

SECTION 6. LOCAL REGULATIONS.

Order 5007. This code shall not be understood to limit the power of cities, villages and towns to make or enforce additional or more stringent regulations provided the same do not conflict with this code, or with any other order of the Industrial commission.

> **Note.** Every municipality is recommended to adopt, for its own benefit:
>
> (1) Definite fire limits, and regulations prohibiting the construction of frame buildings within such limits.
>
> (2) Regulations governing the construction of private residences and other buildings not covered by this code, especially with a view to fire prevention.
>
> (3) Other fire-preventive and sanitary regulations which cannot reasonably be included in a state code.

PART II.

DEFINITIONS AND STANDARDS

Note. The following definitions (Orders 5100, 5101, 5102) apply to buildings which are **required** to be fireproof, mill or ordinary construction. See orders 5201–5202, 5502–5503, 5602, 5702–5703.

SECTION 1. FIREPROOF CONSTRUCTION.

Order 5100. A building is of fireproof construction if all the walls, partitions, piers, columns, floors, ceilings, roof and stairs are built of incombustible material; and if all metallic structural members are protected by an incombustible fire resisting covering of low heat conductivity, of not less than 2 inches thickness of concrete, or 3 inches thickness of other approved material, for columns; not less than 2 inches thickness for girders; and not less than 1½ inches thickness for other structural parts. This thickness shall be outside of the extreme edges of structural members. Such covering shall consist of Portland cement concrete, brick, terra cotta, or tile, laid in cement mortar, or other approved material and shall be properly reinforced, bonded, wired or otherwise secured in place. Steel reinforcement shall be protected as in order 5313. The plastering shall not be applied to wood lath or wood furring strips.

The trimmings and finished floor may be of wood, provided all spaces behind or below same are filled with incombustible material. Partitions entirely contained within a private apartment may be non-fireproof provided the partitions enclosing such apartment are fireproof.

A wood roof with incombustible roof covering will be permitted on a fireproof building not more than 85 feet high, provided the ceiling of the uppermost story is of fireproof construction not suspended from the roof.

For outside windows and doors see order 5201.

Note (a). A "fireproof" floor, ceiling, or wall is one of "fireproof construction." A "standard fire wall," "fireproof partition," etc., are defined in orders 5108-5113. "Incombustible" includes any material which will not burn or support combustion.

Note (b). To secure the best protection against a severe fire, the finish floors, trim, doors, windows, etc., should be made entirely of incombustible material.

The fireproof covering of exterior columns should be at least 4 inches thick to resist a severe fire.

SECTION 2. MILL CONSTRUCTION.

Order 5101. A building is of mill construction if all walls are built of incombustible material, and if all wood girders and joists are at least 5½ inches thick. No wood girder or joist shall measure less than 63 square inches and no wood post less than 90 square inches in sectional area, except that 7½×7½ inch (or larger) posts may be used in the top story only. All structural steel or iron (not including post caps, bases, and joist hangers) shall be fireproofed with not less than one inch of incombustible material or with metal lath and cement or gypsum plaster. The lower thickness of each floor shall be not less than 2⅝ inch lumber with grooves and splines at the joints; this shall be covered with felt or building paper, and with a separate finished floor not less than $^{13}/_{16}$ inch thick.

Note. Floor joists should be at least 7½ inches thick.

The roof shall be at least 2½ inches thick and shall have an incombustible roof covering; if an airtight roof covering (such as felt or tin) is not used, then the roof planking shall be in two thicknesses, with felt or building paper between.

There shall be no openings in the floor unless protected by standard fire doors, and no concealed air spaces except such as are enclosed by incombustible material.

All stairways and elevators shall be enclosed with standard fireproof enclosures.

For outside windows and doors see order 5201.

SECTION 3. ORDINARY CONSTRUCTION.

Order 5102. A building is of ordinary construction if all enclosing walls consist of incombustible material, and the roof has an incombustible covering, but other requirements for fireproof or mill construction are not complied with. No joist, rafter, or stud shall be less than 1⅝ inches thick. Floor and roof joists shall not be supported by combustible stud partitions, but shall be supported by incombustible walls or partitions, or by semi-fireproof partitions (order 5112) or by columns and girders.

For outside windows and doors see order 5201.

SECTION 4. FRAME BUILDINGS.

Order 5103. A frame building is a building whose structural parts and enclosing walls consist of wood. If such enclosing walls are veneered, encased or faced with stone, brick, tile, concrete, plaster or metal whose stability or rigidity depends upon the frame wall, the building is also termed a frame building.

SECTION 5. HEIGHT OF A BUILDING.

Order 5104. The height of a building is measured at the center line of its principal front, from the street grade (or, if setting back from the street, from the grade of the ground adjoining the building) to the highest part of the roof, if a flat roof, or to a point ⅔ the height of the roof, if a gabled or hipped roof. If the grade of the lot or adjoining street in the rear or alongside of the building falls below the grade at the front, the height shall be measured at the center of the lowest side.

SECTION 6. BASEMENT: FIRST FLOOR: NUMBER OF STORIES.

Order. 5105. A basement is a story whose floor line is below the grade at the main entrance and whose ceiling is not more than 9 feet above such grade. The first floor is the floor next above the basement, or the lowest floor if there is no basement. The number of stories of a building includes all stories except the basement.

SECTION 7. INCOMBUSTIBLE ROOF COVERING.

Order 5106. A roof covering shall be considered incombustible if made of three thicknesses of roofing felt with tar and gravel, or if made of tin, corrugated iron or other approved fire resisting material.

SECTION 8. STREET, ALLEY, COURT.

Order 5107. A street is any public thoroughfare 30 feet or more in width. An alley is any public thoroughfare less than 30 feet but not less than 10 feet in width. Any space less than 10 feet wide is a court.

For required size of courts see order 5204.

SECTION 9. STANDARD FIRE STOPS.

Order 5108. Standard Fire Wall. A standard fire wall shall be built of brick or concrete not less than 12 inches in solid thickness, or of reinforced concrete not less than 6 inches thick. Every standard fire wall shall extend either from the foundation or from a fireproof floor, to a fireproof ceiling; or if the roof is not fireproof, such wall shall extend at least 3 feet above the highest adjoining roof line of the same building and shall be capped with stone, tile, or other indestructible material. Every opening in a standard fire wall shall be closed with a standard fire door or a fixed standard fire window.

> **Note.** Windows in a fire wall should be avoided if possible, because even a wire glass window permits an intense radiation of heat and may melt in a hot fire. Windows are not permitted in a division wall. (Order 5201).

Order 5109. Standard Fireproof Enclosure or Partition. A standard fireproof enclosure or partition shall be made either of wired glass in metal frame, or of solid plaster not less than 2 inches thick on metal lath and metal frame, or of brick, concrete or tile of sufficient thickness to give rigidity. The windows in a fireproof enclosure or partition shall be standard fire windows and the doors shall be standard fire doors; except that the doors may contain wired glass as specified for standard fire windows.

> **Note.** A wired glass enclosure does not offer as high a degree of protection as the other types mentioned, be-

cause of the radiation of heat through the glass, and the tendency of the exposed metal frame to buckle when heated.

Order 5110. Standard Fire Door. A standard fire door shall consist of a wooden core encased with tin, or shall be entirely of metal; and shall be of design approved by the Industrial commission. The door frame shall be metal. The door shall close automatically in case of fire.

Order 5111. Standard Fire Window. A standard fire window shall have a metal frame, metal sash, and wired glass, of design approved by the Industrial commission. No pane shall be less than 1/4 inch thick nor of greater area than 720 square inches. The window shall be either fixed or shall close automatically in case of fire.

Order 5112. Semi-Fireproof Partition. A semi-fireproof partition shall be constructed of not less than 1⅝×3⅝ inch studding, spaced not more than 16 inches center to center, with the 3⅝ inch dimension at right angles with the plane of the wall, and having the following protection on both sides of the partition:

(1) metal lath and at least 3/4 inch of Portland cement or gypsum plaster; or

(2) good quality plaster board at least ½ inch thick, covered with sheet metal or

(3) 1/4 inch asbestos board, covered with at least 1/2 inch Portland cement or gypsum plaster, or with sheet metal; or two layers of 1/4 inch asbestos board, breaking joints; or

(4) the spaces between studding may be filled with approved incombustible material, the partition being plastered with Portland cement or gypsum plaster on metal lath; or

(5) other equivalent approved fire resisting construction.

Below every hollow semi-fireproof partition, whether bearing or non-bearing, the spaces between floor joists shall be fire stopped as provided in order 5318.

Every doorway in a semi-fireproof partition shall be protected with a standard fire door or with a self-closing wooden door at least 7/8 inch thick in its thinnest part. The glass in such partitions and doors shall be wire glass.

Note. A fire door is of course much better than an unprotected wooden door. Many types of ornamental fire doors are now on the market. Wooden doors if used should preferably be at least 1½ inches thick.

Order 5113. Semi-Fireproof Ceiling. A semi-fireproof ceiling shall be constructed of not less than 1⅝ inch joists, spaced not more than 16 inches center to center, protected on the under side the same as specified for a semi-fireproof partition (order 5112). The spaces between the joists shall be fire stopped as provided in order 5318, at intervals not greater than 25 feet.

Order 5114. Combustible Partitions or Ceiling. Every partition, ceiling or wall which is not fireproof or semi-fireproof is considered combustible.

SECTION 10. STANDARD EXITS.

Note. The following orders contain specifications for various types of exits (means of ingress and egress).

Exits may be classified as follows:

- Stair Exits:
  - Exterior enclosed stairway, or smoke proof tower.
  - Interior enclosed stairway.
- Horizontal Exits.

The foregoing types of exits are now generally agreed to be the most efficient. Enclosed stair shafts, and fireproof dividing partitions, prevent the spread of fire and protect both life and property. The exterior enclosed stairway, or smokeproof tower, is the safest possible form of stair exit and also furnishes a protected position from which firemen can attack a fire on any floor.

The following types of exits have a limited value and are permitted under certain conditions:

- Open or unenclosed stairways:
  - Interior.
  - Exterior.
- Fire escapes:
  - "A" fire escapes.
  - "B" fire escapes.

Unenclosed stairways and outside fire escapes are not reliable for the protection of life, except in low buildings, and are no protection for property.

To secure the best possible fire protection in a building accommodating a considerable number of persons, the building should be divided by a fireproof wall or partition, the two sections being connected by horizontal exits through or around the dividing wall, and each section being provided with one or more enclosed stairways; one stairway should be an exterior enclosed stairway, if possible. In case of fire in one section of such a building, the occupants can escape by the horizontal exits to the other section, and thence leave the building by means of the stairways without panic. The same protection can be secured in the case of two adjoining buildings, by connecting the two buildings with horizontal exits, each building being provided with one or more enclosed stairways. Where only a moderate number of persons are accommodated, the dividing partition is not so essential, but the stairways should be enclosed.

Exits of the types just mentioned are required by law in many states and cities and are recommended by all fire protection experts. Such exits afford the best protection for both life and property and are much more efficient than the outside fire escape.

Fire drills are of great value in lessening the danger of panic and loss of life.

For the number, size, type, and location of exits in buildings of various classes, see the orders on exits in Parts V to VIII (orders 5401–5, 5507–14, 5605–6, 5710–12).

Order 5115. Exterior Enclosed Stairway. (Smokeproof Tower). An exterior enclosed stairway shall be an enclosed stairway which is entirely cut off from the building and which is reached by means of open balconies or platforms. The entire stair enclosure, stairway balconies and balcony railings shall be made of incombustible material throughout. The wall separating the stairway from the building shall not be pierced by any door, window, or other opening. In a fireproof building this wall shall be built as prescribed for a standard fireproof enclosure (order 5109) but without glass; in a non- fireproof building, this wall shall be built as prescribed for an outside wall (orders 5304–5311). The doors leading from the building to the balconies and from the balconies to the stairway shall be standard fire doors, and all openings within 10 feet of any balcony shall be protected with standard fire windows or standard fire doors. Each balcony shall be covered at the top and shall be open on at least one side, with a railing on all open sides not less than 3 feet high. See orders 5117–5119.

Order 5116. Interior Enclosed Stairway. An interior enclosed stairway shall be completely enclosed with a standard fireproof enclosure (order 5109); except that in buildings of not more than three stories, such stairways may be enclosed with semi-fireproof partitions (order 5112). In any case, such enclosure shall include at each floor level a portion of such floor which shall be at least as wide as the stairway; and such enclosure shall also include the passageway (if any) leading from the stairway to an outside door; so as to afford uninterrupted passage from the uppermost floor to such outside door, without leaving the enclosure. If windows are placed in such enclosure (excepting in the outside wall), such windows shall be fixed.

> **Note.** Such windows permit an intense radiation of heat and should be avoided if possible. Where unavoidable, they should be placed at least six feet above the stairs or platforms.
>
> See also the following orders.

Order 5117. All Stair Exits: Width. Every required stairway, whether enclosed or not, shall be at least 3 feet 8 inches wide, of which not more than 4 inches on each side may be occupied by a handrail. Every platform shall be at least as wide as the stairway, measuring at right angles to the direction of travel. Every straight-run platform shall measure at least 3 feet in the direction of travel. Wherever a door opens onto a stairway, a platform shall be provided extending the full width of the door.

The width of any stairway shall be the clear distance between walls or stringers, of which not more than 4 inches on each side may be occupied by a handrail.

> **Note:** If other stairways are provided in addition to those required by this code, such additional stairways need not conform to these orders.

Order 5118. All Stair Exits: Handrails. All stairways and steps of more than three risers shall have at least one handrail. Stairways and steps 5 feet or more in width, or open on both sides, shall have a handrail on each side. Stairways more than 8 feet wide shall be divided by center rails into widths not more than 8 feet nor less than 3 feet 8 inches. Center rails shall have upper newel post at least 5 feet 6 inches high, or rail may be turned down to the floor in a manner to prevent hindrance. Rails shall be not less than 2 feet 6 inches vertically above nose of treads or 3 feet above platform.

For theaters and assembly halls, see also order 5508.

Order 5119. All Stair Exits: Risers and Treads. All stairways and steps used by the public or by more than 20 persons, shall have a uniform rise of not more than 7¾ inches and a uniform tread of not less than 9½ inches, measuring from tread to tread, and from riser to riser; no winders shall be used; there shall not be more than 18 risers between platforms or between floor and platform, or not more than 22 risers from floor to floor with no platform; in stairs used by the public (theaters, public assembly halls, retail stores, schools, hotels, and similar buildings) there shall not be less than 3 risers between platforms or between floor and platform. Stairways or steps not used by the public or by more than 20 persons, shall have a uniform rise of not more than 8 inches and a uniform tread of not less than 9 inches; if winders are used, the tread shall be at least 7 inches wide at a point one foot from the narrow end.

For theaters and public assembly halls, see also order 5509.

Order 5120. Horizontal Exit. A horizontal exit shall be an opening through a standard fireproof partition (order 5109) or wall which separates two buildings or two divisions of a building; or an exterior balcony or bridge not less than 3 feet 8 inches wide, connecting two buildings or two divisions of a building. Every such opening shall be protected by a standard fire door on each side of the wall, and the door on one side shall be selfclosing; the opening shall not exceed 48 square feet in area.

Note: A self-closing door is a door which is normally closed. An automatic door closes only in case of fire.

Every such balcony or bridge, together with its railings and its supporting brackets or beams, shall be constructed the same as specified for fire escapes, (orders 5123–5125, 5128) except that the floor may be solid if the balcony or bridge is covered by an incombustible roof. The floor shall not have a slope of more than one foot in five. All doors and windows which open onto the balcony or bridge, or which are within 10 feet of the same, shall be standard fire doors or standard fire windows; but if such doors and windows are in walls which are in the same plane, then this requirement shall apply only to those doors and windows which are within 5 feet of the dividing wall.

The floor on each side of a horizontal exit shall contain at least 3 square feet of unobstructed floor space per person, for all persons accommodated on both sides of such exit; and shall contain at least one stairway, which shall be enclosed if the building is more than two stories high.

See also order 5132.

Order 5121. Fire Escapes: Location. Every fire escape shall be so located as to lead directly to a street, alley, or open court connected with a street.

Every fire escape shall be placed against a blank wall if possible. If such location is not possible, then every wall opening which is less than 6 feet distant from any riser of the fire escape shall be protected by a standard fire door or standard fire window, except in the top story.

> **Note.** For the number, size, and location of fire escapes on new buildings of various classes, see the orders on exits in Parts V to VIII (orders 5401–5405, 5512–5514, 5605–5606, 5710–5712).
>
> General orders covering the number, size and location of fire escapes on existing buildings will be issued in the near future. Meanwhile, special orders will be issued where necessary.
>
> The following orders define two sizes of fire escapes, called "A" and "B". Where not otherwise stated, the orders apply to both sizes.

Order 5122. Exits to fire escapes. Every fire escape shall be accessible from a public passageway through a standard exit door (order 5132) except that a door to an "A" fire escape may be not less than 2 feet 6 inches wide; and except as follows:

For "A" fire escapes on existing buildings the door sill may be not more than 8 inches above the inside floor level, or may be higher if a stair leads from the floor to the sill; or two windows may take the place of such door if approved by the Industrial commission. The sills of such windows shall be not more than 18 inches above the fire escape platform and shall be not more than 2 feet above the inside floor level unless a stair shall lead from the floor to the sill. Every such window shall have the lower sash hinged so as to swing out, or hung to raise, so as to provide a clear opening not less than 2 feet 6 inches wide nor less than 2 feet 10 inches high. Hinged sash shall have hardware the same as prescribed for doors (order 5132). Sliding sash shall have at least one bar sash lift.

Order 5123. Fire Escapes: Material and Strength. No other material than wrought iron or soft or medium steel shall be used for any part of a fire escape, except for weights, separators, and ornaments. Each part of every fire escape (except counterweights for balanced stairways) shall be designed and constructed to carry a live load of 100 pounds per square foot of horizontal area over the entire fire escape. Each part of every fire escape shall be designed and constructed in accordance with the requirements on Structural Design (order 5316) except that the unit stresses therein specified shall be reduced by one-fourth. The minimum sections and sizes specified below, shall be increased whenever necessary so that under full load the allowable unit stresses will not be exceeded.

Order 5124. Fire Escapes: Platforms. Each platform of an "A" standard fire escape shall be at least 28 inches wide; each platform of a "B" standard fire escape shall be at least 3 feet 4 inches wide. Such widths shall be the clear distance between stringers, measuring at the narrowest point. Each platform shall extent at least 4 inches beyond the jambs of exit openings. The above minimum widths and lengths shall be increased, wherever necessary, so that no exit door or window will, when open, block any part of the required width of the fire escape.

Every platform shall consist of either

(1) Flat bars on edge, not less than 1x¼ inch; but not less

than $1\frac{1}{4}$x$\frac{1}{4}$ inch where bolts and separators are used; bars shall be not more than $1\frac{1}{4}$ inches center to center.

(2) $\frac{1}{2}$ inch or $\frac{5}{8}$ inch square bars with sharp edge up, not more than $1\frac{1}{2}$ inches center to center.

(3) $\frac{5}{8}$ inch round bars, not more than $1\frac{1}{2}$ inches center to center.

The platform frame shall consist of not less than 2x$\frac{3}{8}$ inch flat bars on edge or equivalent, provided the brackets are not more than 4 feet apart. If brackets are more than 4 feet apart, the frame shall be correspondingly stronger and stiffer. Every platform wider than 30 inches, if made of square or round bars, shall have a third frame bar through the center; if made of flat bars, the platform shall have separators and bolts through the center.

There shall be a platform at each story above the first and intermediate platforms if floors are more than 18 feet apart vertically.

Platforms shall not be more than 8 inches below the door sill, or not more than 18 inches below the sill of exit windows; see order 5122.

Order 5125. Fire Escapes: Brackets. Brackets for a 28 inch or 30 inch platform, when spaced not more than 4 feet apart, shall be made of not less than $\frac{7}{8}$ inch square bars or $1\frac{1}{2}$x$1\frac{1}{2}$x$\frac{1}{4}$ inch angles; such bars or angles shall be larger if the platform is wider or if the brackets are farther apart. Each bracket shall be fastened at the top, to the wall, by a through bolt (at least $\frac{7}{8}$ inch diameter), nut, and washer (at least 4 inch diameter). The slope of the lower bracket bar shall be not less than 30 degrees with the horizontal. The lower bar shall have a washer or shoulder to give sufficient bearing against the wall.

> **Note.** In applying the requirements for Structural Design (order 5316) to the design of a bracket, the lower bracket bar must be designed according to the column formula. According to this formula (for example), brackets made of 1 inch square wrought iron, 4 feet apart, carrying a 3 feet 4 inch platform, are just within the limit of stiffness. If the brackets were over 4 feet apart, a heavier bar or an angle would have to be used.

The strength of the wall to which brackets are to be attached shall be carefully considered in determining the spacing, shape, and inside connection of brackets, so that under full load the wall will not be unduly strained.

Order 5126. Fire Escapes: Stairways. Each stairway of an "A" standard fire escape shall be at least 24 inches wide between stringers; such stairway shall have a uniform rise of not more than 8 inches, and a uniform run of not less than 8 inches.

Each stairway of a "B" standard fire escape shall be at least 3 feet four inches wide between stringers; such stairway shall have a uniform rise of not more than 8 inches, and a uniform run of not less than 9 inches.

> **Note.** The rise is the vertical distance from the extreme edge of any step to the corresponding extreme edge of the next step. The run is the horizontal distance between the same points.

Stairway stringers shall consist of either

(1) A 5 inch channel or larger.
(2) Two angles 2x2x¼ inch or larger.
(3) Two flat bars 2x⅜ inch or larger.
(4) One flat bar 6x¼ inch or larger.

If two angles or two flat bars are used, they shall be properly tied together by lattice bars, vertical as well as horizontal. If flat bars are used, every stairway of more than 10 risers shall have lateral bracing. The connection of stringers to platform, at top and bottom, shall be at least equal in strength to the stringers and shall safely carry the full live and dead loads. If stringers are carried by intermediate brackets, the stringers shall have a horizontal bearing on the brackets and shall be properly and securely connected thereto.

Treads shall consist of either flat or square bars, (not round), of the size and spacing specified for platforms. An "A" standard tread shall consist of at least six such bars. A "B" standard tread shall consist of at least seven such bars. A "B" standard tread made of flat bars shall have separators and bolt through the center. A "B" standard tread made of square bars shall be trussed.

Order 5127. Fire Escapes: Balanced Stairway. A balanced stairway shall be provided for every fire escape which does not reach to the ground, excepting "A" standard fire escapes which have a platform at least 3 feet long, not more than 10 feet about the ground. The balanced stairway shall conform to the requirements for other stairways except that the stringers and the top rail may be lighter if they are properly trussed. The counterbalancing device shall be attached to both sides of the stairway equally, or a special attachment shall be used to prevent warping or twisting. The counterbalancing device shall operate gradually and easily as the live load is applied.

> **Note.** The use of cables and sheaves will be permitted only under exceptional conditions, as rust is almost sure to interfere with their proper operation. In such cases the sheaves shall turn on a brass pin or in brass bearings and shall be protected from the weather at the top and on all sides.

Order 5128. Fire Escapes: Railings. Railings shall be provided on all open sides of platforms and stairways, and on both sides of balanced stairways. Railings shall be at least 3 feet high, measuring vertically from floor of platform or from nose of step.

Every railing shall have posts, not more than 5 feet apart, made of not less than 1½x1½x¼ inch angles or tees, or 1¼ inch pipe; top rail not less than 1¼x1¼x¼ inch angle or equivalent; center rail not less than 1¼x$\frac{5}{16}$ flat bar or equivalent. All connections shall be such as to make the railing stiff; two bolts (⅜ inch or larger) shall be used at the foot of each post wherever possible, or at least one ½ inch bolt shall be used. Railings shall be continuous. No projections on the inside of the railing shall be permitted. Where a railing returns to the wall, it shall be fastened thereto with a through bolt (at least ⅝ diameter), nut, and washer; or (in reinforced concrete) with an approved insert; or the railing shall be made equally secure with a diagonal brace extending at least 3 feet horizontally and 3 feet vertically.

All outside railings which are more than 60 feet above grade shall be at least 6 feet high, measuring vertically from floor of platform or from nose of step. Such railings shall be of special design approved by the Industrial commission, having not less than four longitudinal rails, and vertical lattice bars not more than eight inches apart, and proper stiffening braces or brackets.

Order 5129. Fire Escapes: Ladder to Roof. Every standard fire escape shall be provided with a standard fire ladder (order 5134) leading from the upper platform to the roof, unless the fire escape stairway leads to the roof.

For standpipes see order 5135.

Order 5130. Other Types of Fire Escape. Sliding or chute fire escapes may be used, upon the approval of the Industrial commission, in place of standard "A" or "B" fire escapes. Every sliding fire escape shall be provided with a standard fire ladder extending from 5 feet above grade, to 4 feet above the roof coping, and securely fastened to the platforms of the sliding fire escape.

Order 5131. Outside Stairways. An outside stairway with solid platforms and treads may serve as a fire escape if it is covered by a roof. Such stairways shall be built of incombustible material and be protected as specified in order 5121, except as otherwise provided (orders 5403, 5710). See also orders 5117-5119.

Order 5132. Standard Exit Doors. Every door which serves as a required exit from a public passageway or stairway, or which forms a horizontal exit, shall be a standard exit door. See also orders 5406, 5515, 5607, 5712.

Every standard exit door shall swing outward or toward the natural means of egress (except as below and as in orders 5406, 5712). It shall be level with the floor (except for "A" fire escapes on existing buildings). It shall be so hung that, when open, it will not block any part of the required width of any other door way, passageway, stairway, or fire escape. No revolving door, (unless collapsible) and no sliding door, (except where it opens onto a stairway enclosure, or serves as a horizontal exit) shall be considered as a standard exit door.

> **Note.** Where revolving doors are used, it is recommended that swinging doors also be provided.
>
> For doorways opening into a stairway enclosure, swinging doors are recommended, especially where used by more than 20 persons.

A standard exit door shall have such fastenings or hardware that it can be opened from the inside without using a key, by pushing against a single bar or plate, or turning a single knob or handle; it shall not be locked, barred, or bolted at any time while the building is occupied.

> **Note.** For theaters, schools, large factories and hotels, etc., the "panic bolt" which operates by pressure against a bar or plate is recommended.

A standard exit doorway shall not be less than 6 feet 4 inches high by 3 feet 4 inches wide, except where especially provided (orders 5512, 5607, 5712). No such doorway or group of doorways shall be more than 6 inches narrower than the required width of the stairway or passageway leading thereto.

Over every emergency exit door, and over every exit door where other doors or openings may cause confusion, a sign shall be placed bearing the word "Exit" or "Out" in plain letters not less than 5 inches high. Red lights shall be provided over all such exits which are liable to be used at night.

Order 5133. All Exits: Location and Obstructions. Every exit mentioned in orders 5115–5132 shall lead to a street, alley or open court connected with a street. All such exits, and all passageways leading to and from the same, shall be kept unobstructed at all times.

SECTION 11. STANDARD FIRE LADDER.

Order 5134. A standard fire ladder leading to the roof shall be provided on every building of more than three stories, unless

(1) There is a fire escape or an exterior enclosed stairway leading to the roof; or

(2) The building is of fireproof construction and is provided with an approved automatic sprinkler system.

A standard fire ladder shall have stringers of not less than 1¼ inch pipe, or not less than 2x⅜ inch flat bars, at least 17 inches apart in the clear. The rungs shall be not less than ½ inch square or ⅝ inch round bars, 14 inches center to center. The stringers shall be securely tied together at intervals no greater than every fifth rung.

A platform shall be provided at each story above the first, placed about 18 inches below the window sill. The ladder shall be securely fastened on the outside of the platform. The platform, brackets and railing shall be built as specified for standard fire escapes, except that the platform bars may be not more than 2 inches center to center. Each platform shall be at least 28 inches wide, and shall be long enough to give access to two windows wherever possible, but in no case shall the platform be less than 5 feet long.

The top rung of each ladder shall be not less than 4 feet above the roof coping, and the ladder shall return within 2 feet of the roof if the coping is more than 2 feet above the roof. The bottom rung of each ladder shall be not more than 8 feet above the ground, unless the ladder starts at the upper platform of a fire escape or stairway.

> **Note.** Fire ladders are primarily for the use of the fire department and are not accepted as fire escapes, except for theater fly galleries.

SECTION 12. STANDPIPES, FIRE EXTINGUISHERS, AND SPRINKLERS.

Order 5135. Exterior Standpipes. If water supply of sufficient pressure is available, a standard exterior standpipe shall be attached to every fire escape, fire ladder, or exterior enclosed stairway, on every building of more than three stories not having an automatic sprinkler system; except that theater buildings requiring more than one fire escape on any side thereof, shall be provided with at least one standard standpipe on each side.

Every standpipe shall extend from a point within 5 feet of the ground to a point 3 feet above the roof or cornice, and shall be securely fastened to and accessible from each platform. The standpipe shall be made of not less than 3 inch wrought pipe, with 2½ inch outlet hose valve at each floor and at roof, and a double Siamese valve at the base of the pipe. All connections shall conform to the size and pattern used by the local fire department, and the entire standpipe shall conform to all requirements of such department.

Order 5136. Interior Standpipes. For the number and location of interior standpipes required in buildings of various classes, see the sections on standpipes in Parts V to VIII (orders 5411, 5537, 5619, 5722). Where no other ratio is stated, one standard interior standpipe shall be installed for each 10,000 square feet of floor area or fraction thereof.

Standpipes shall connect with city water mains or with an elevated tank of approved design and capacity, and shall be provided with hose and valve at each story, located not more than 5 feet above the floor.

The hose shall be not less than 1½ inches in diameter, and shall be kept connected, in good repair and working order, and ready for immediate use at all times.

The size of pipes and other details of installation, shall be as approved by the Industrial commission.

An approved automatic sprinkler system will be accepted as a substitute for interior standpipes, except in theaters (orders 5537, 5539).

> **Note.** The Industrial commission will ordinarily approve any sprinkler or standpipe installation which is approved by the Underwriters.

Order 5137. Fire Extinguishers. Where standard chemical fire extinguishers are required, they shall be of a capacity of three gallons and of a type approved by the Industrial commission, and shall be discharged and recharged at least once a year.

Order 5138. Automatic Sprinklers. Where an automatic sprinkler system is required throughout the building (orders 5412, 5539), such system shall be supplied either from the city water mains or from a gravity or pressure tank. If city water supply of adequate volume and pressure is not available, a tank shall be provided.

Where automatic sprinklers are required in the basement only (orders 5412, 5723) they shall be supplied from the city water mains. If there is no city water supply, such basement sprinklers will not be required. If in the future a city supply becomes available, then the basement sprinklers shall be installed.

> **Note.** It is better to install the basement sprinklers anyway, so as to be ready when the city water becomes available.

Every basement sprinkler system shall also include sprinklers in all shafts (except elevator shafts) leading upward from the basement.

Every sprinkler system shall also have a suitable connection for the fire department. Where a complete sprinkler system is provided (whether required or not) exterior and interior standpipes may be omitted, except interior standpipes in theaters. The number and location of sprinklers, size of pipe, size and location of tank (if any), and all other details of equipment, shall conform to the best standard practice.

> **Note.** The Industrial commission will ordinarily approve any sprinkler system which is approved by the Fire Underwriters.
>
> The commission reserves the right to order a sprinkler system in any building, regardless of its height or number of persons, if the occupancy is especially hazardous.
>
> Automatic sprinklers probably give the best fire protection for the least cost, for both life and property. They are recommended for use in hotels throughout the building, in basement of schools and public halls and theaters, and in most mercantile and factory buildings.

GENERAL NOTE.

The word "approved," as used in defining the foregoing standards, or in any other part of this code, means "approved by the Industrial commission"; and any other discretionary power required or implied by any part of this code, lies with the Industrial commission.

PART III.

GENERAL REQUIREMENTS

Note. For general requirements on stairways, doors, fire ladders, standpipes, etc., see the definitions of these terms, orders 5115–5135.

SECTION 1. DESIGN AND SUPERVISION OF BUILDINGS.

Order 5200. Every building should be designed by a competent architect, engineer, or builder, in accordance with this code; and shall be constructed under the supervision of a competent superintendent or inspector, in accordance with the plans and specifications of the designer. The designer may also act as superintendent. No material change from the original plans and specifications shall be made except with the knowledge and consent of the designer. No owner shall construct any building or permit any building to be constructed except in accordance with this section.

> **Note.** This requirement of a competent designer and a competent superintendent is in the best interests of the owner, the workman and the community. Proper supervision, either by the designer or by someone else, is quite as important as proper design. The record of building collapses in the United States shows that a large proportion of these accidents are caused by failure to follow plans.
>
> This section does not in any way prevent a responsible contractor or builder from acting as designer or superintendent or both, if the owner so desires. This section simply makes it the duty of the owner to see that some competent person or persons are definitely responsible for the design and construction of the building in accordance with this code and with standard building practice.

SECTION 2. HEIGHT AND CLASS OF CONSTRUCTION.

Order 5201. See also orders 5502–3, 5602, 5702–3. In a fireproof building exceeding 160 feet in height, all stairway and corridor windows and doors shall be standard fire windows and standard fire doors, except that the doors may contain glass as specified for standard fire windows. The stairway and corridor finish and floors shall be made entirely of incombustible material.

> **Note.** This code sets no limit to the height of a fireproof building, as it is felt that this is a matter of general community welfare rather than of the safety of the individual occupants. The Industrial commission strongly recommends that each municipality adopt such a limit before the rise in central land values makes such action a hardship to the property owner.

Buildings of mill construction shall not be higher than 85 feet above the grade.

Buildings of ordinary construction shall not be higher than 60 feet above the grade.

Frame or veneered buildings shall not be higher than 40 feet above the grade.

Roof appendages such as dormer windows, domes, towers, tanks, turrets, spires, skylights, monitors, penthouses or other projections above the main roof of a building shall not exceed in total area 20 per cent of the main roof, otherwise the building height limit shall apply to the roof of such appendage.

No appendage on the roof of a building of mill construction shall exceed a height of 110 feet above the grade.

No appendage on the roof of a building of ordinary construction shall exceed a height of 80 feet above the grade.

No appendage on the roof of any frame or veneered building shall exceed a height of 50 feet above the grade; the walls and roof of all such appendages shall be covered with incombustible material.

Pent houses containing elevator machinery shall be constructed as required by the general orders on Elevators issued by the Industrial commission.

In every building more than two stories high which is required to be of fireproof, mill or ordinary construction, all outside doors and windows shall be standard fire doors and standard fire windows if they are less than 15 feet away from any adjoining lot line or from the center of an adjoining alley, or if they are less than 30 feet away from any other building; but this shall not apply to walls, windows and doors which lie in the same or parallel planes facing in the same direction.

SECTION 3. FLOOR AREAS.

Order 5202. The maximum undivided floor area in any building more than one story in height shall be as follows:

Fireproof construction	18,000 square feet
Mill construction	10,000 square feet
Ordinary construction	7,500 square feet
Frame buildings	5,000 square feet

The areas in the foregoing table may be increased as follows:

In two story buildings, by 50 per cent.

In buildings equipped with an approved automatic sprinkler system, by 30 per cent.

In buildings fronting on at least three streets, or two streets and an alley, by 20 per cent.

Every such increase shall be computed on the original maximum area. The increases are cumulative.

Where a dividing wall is required in any building, such wall shall be of solid incombustible fire resisting material of the same thickness as required for enclosing walls (orders 5304–5310); and shall be continuous from the foundation to the roof, in a fireproof building, or to 3 feet above the roof in a non-fireproof building. Each opening in a division wall shall have a standard fire door on each side of the wall.

Note (a). This code does not limit the area of one story buildings, as such limitation is not strictly necessary for the safety of the occupants. Such buildings should be limited by municipal regulation, as a fire preventive measure.

Note (b). Special cases may arise where the above limitations of height and area would be unduly restrictive. The Industrial commission will, on application, make a special ruling in any case where any part of this code would operate unreasonably. See under "Appeal", p. 5.

SECTION 4. WINDOWS AND COURTS.

Order 5203. Windows. Every room in which one or more persons live, sleep, or are employed, (except storage rooms or other rooms where the nature of the occupancy will not permit) shall be lighted by a window or windows opening directly upon a street or alley or upon a court on the same lot with the building. The windows shall be so constructed and distributed as to afford proper light and ventilation. Every building more than 40 feet deep (measuring at right angles to the windows) shall have windows on at least two sides.

Note. For toilet room windows see order 5207.

Order 5204. Courts. By inner court is meant an open air shaft or court surrounded on all sides by walls.

By inner lot line court is meant a court bounded on one side and both ends by walls and on the remaining side by a lot line.

By outer court is meant a court extending to a street, alley, or open space not less than 15 feet wide.

By outer lot line court is meant a court with one side on a lot line and opening to a street or open space not less than 15 feet wide.

In applying the following requirements, a building from 30 to 43 feet high shall be considered as having at least three stories, and each additional 13 feet shall be considered an additional story.

No outer lot line court, measured from the lot line to the wall of the building, shall be less than 3 feet wide for a court two stories or less in height. For courts more than two stories in height, the width of such courts shall be increased one foot for each additional story.

Where an outer court is situated between wings or parts of the same building or between different buildings on the same lot, the width of said court measured from wall to wall shall not be less than 6 feet, provided the court does not exceed 36 feet in length, and provided the court does not exceed four stories in height; for each additional story in height such court shall be increased one foot in width; and for each additional 10 feet of increase or fraction thereof in the length of such court, the entire width shall be increased one foot; and the increase in width shall be cumulative.

No inner lot line court shall be less than 6 feet in width, or less than 60 square feet in area, for courts two stories or less in height; no inner court shall be less than 10 feet in width nor less than 150 square feet in area for courts two stories or less in height; and for every additional story every such inner court or inner lot line court shall be increased by at least one lineal foot in its length and one lineal foot in its width.

No court shall be covered by a roof or skylight but the entire required area shall be open and unobstructed from the bottom thereof to the sky. No fire escape or stairway shall be constructed in any court unless the court be enlarged proportionately.

All walls of inner courts whose least horizontal dimension is less than one fourth the height, shall be faced with material with a permanent white surface or shall be painted white at least every two years.

At the bottom of every shaft or inner court there shall be sufficient access to such shaft or court to enable it to be properly cleaned out. Every inner court shall have an intake for fresh air, leading from the street or other open space. The area of such intake in square feet shall equal at least two one thousandths of the number of cubic feet contained in said court; but such area need not be more than 50 square feet. Every intake shall be constructed of fireproof material and unless said intake is used as a passageway for persons, there shall be no openings into the same other than the inlet and outlet.

No buildings shall be altered or enlarged to encroach upon space reserved under this code for light and air on the lots or parcels of ground on which such building is erected.

SECTION 5. TOILET ROOMS.

> **Note.** The subject of *sanitation in places of employment* has already been covered by the Industrial commission's General Orders on Sanitation. The following section is substantially the same as these General Orders; but to avoid confusion, the owner or designer of a factory or other place of employment should consult the General Orders on Sanitation for places of employment.

For the number of closets and urinals required in buildings of various classes (other than places of employment) see **orders 5536, 5618, 5721.**

For detailed requirements regarding fixtures, piping, etc., see State Plumbing Code issued by the State Board of Health.

Order 5205. Separate Toilet Rooms Required. In every building accommodating persons of both sexes (except apartment houses), separate toilet rooms shall be provided. Toilet rooms for the two sexes, when adjoining, shall be separated by a sound proof partition of material which cannot be easily cut or defaced. Each toilet room shall be distinctly marked with respect to the sex which uses it and no person shall be allowed to use a toilet room assigned to the opposite sex.

Order 5206. Toilet Rooms: Construction. The floor and base of every toilet room (except in a private apartment) shall be constructed of material (other than wood) which does not readily absorb moisture and which can be easily cleaned. The walls and ceiling shall be completely covered with smooth Portland cement or gypsum plaster, glazed brick, metal, or other smooth, non-absorbent material. Each toilet room shall be completely enclosed.

> **Exception.** The provisions of the two preceding orders are recommended, but not required, for rooming or lodging houses which accommodate less than 12 persons not members of the family.
>
> **Note.** In toilet rooms of private apartments it is recommended that at least a portion of the floor, under and around the closet, be constructed as above specified.

Order 5207. Toilet Rooms: Location, Light, Ventilation. Every toilet or bathroom shall be lighted by a window or windows opening directly upon a street, alley, court, or vent shaft. Every such court or vent shaft shall have an area of at least one square foot for each water closet or urinal which it ventilates, but the least dimension of any such vent shaft shall not be less than 3 feet; except that for a single closet used by not more than four persons, a vent flue may be used at least one square foot in area.

No toilet room shall have movable windows or ventilators opening on any court which contains windows of sleeping or living rooms above; except that a toilet room containing not more than two closets may have such movable windows or ventilators, provided such room has a ventilating flue or pipe running above the roof.

The window space for a toilet room containing one closet shall be at least 4 square feet, with 2 square feet additional for each additional closet. These windows shall be so constructed that they can be opened to give adequate ventilation to the room.

If outside windows are impracticable, the facts may be laid before the Industrial commission.

Every toilet room shall have at least 10 square feet of floor area, and at least 100 cubic feet of air space, for each water closet and each urinal.

Every toilet room (except in a private apartment) shall be artificially lighted during the entire period that the building is occupied, wherever and whenever adequate natural light is not available, so that all parts of the room are easily visible.

Order 5208. Water Closets. Individual water closets made of porcelain or vitreous chinaware shall be used. Every closet shall be equipped with a trap located above the floor and with adequate flushing device which uses not less than 3 gallons of water for each flush. The trap shall be properly ventilated. The seat of each water closet shall be made of wood or other non-heat-absorbing material and shall be finished with varnish or other substance which will make it impervious to water.

Every closet shall hold a sufficient quantity of water and be of such shape and form that no fecal matter will collect on the surface of the bowl.

Order 5209. Urinals. Each urinal shall be made of impervious material and shall be properly flushed and kept in clean condition. If iron is used in the construction of a urinal, it shall have fired enamel on the inside of the trough or bowl.

Order 5210. Partitions for Water Closets and Urinals. Each water closet shall be separated by a partition not less than 5 feet in height. Each individual urinal or urinal trough shall be provided with a partition at each end and at the back, to give privacy. Where individual urinals are arranged in batteries, a partition shall be placed at each end and at the back of the battery. A space of 6 to 12 inches shall be left between the floor and the bottom of the partition.

> **Note.** It is recommended that the partitions between water closets and urinals be made of material (other than wood) which does not readily absorb moisture.

Order 5211. Water Closets Where no Sewage System is Available. Each water closet, urinal, lavatory or slop sink located in a toilet room, shall be connected with a sewer system, where a sewer system is available. In localities where a sewer system is not available, or cannot be made available, the disposal of human waste may be accomplished in one of the following three ways:

1. Bacterial or septic tank.
2. Double-compartment cess-pool.

Note. For detailed requirements on septic tanks and cess-pools, see State Pumbing Code.

3. Where the local conditions are such that the above installations are impractical, the following installation may be made with the consent of the Industrial commission:

Direct discharge into a tight masonry privy vault extending not less than 12 inches above the surface of the surrounding ground, and provided with a shelter house having all openings in doors, and all windows and ventilating openings protected by metal screens to prevent the entrance of flies. The doors shall be self closing.

SECTION 6. BOILERS, FURNACES AND STOVES.

Order 5212. Fireproof Room. Every boiler operating with more than 15 pounds steam pressure per square inch shall, together with furnace and breeching, be enclosed with a standard fireproof enclosure and fireproof ceiling and floor, or be located in a separate building, or be separated from the remainder of the building by a division wall as described in order 5202.

See also orders 5531, 5616, 5719.

Order 5213. Protection of Floor. Every boiler, furnace, or oven shall be placed on a fireproof floor projecting at least two feet on all sides. Such floor shall also be provided for every stove or range which is more than 16 square feet in horizontal area or which has a flame at the bottom. If any such floor rests on or is in contact with any combustible material, then the fire proof floor layer shall be at least 5 inches thick and shall be hollow, with air spaces running horizontally through the same. The air spaces shall be open at both ends and shall be so placed that air can circulate through them; their horizontal area shall equal at least ½ the horizontal area of the fireproof slab.

> **Note.** The purpose of these air spaces is to permit air to circulate through the fireproof slab and keep down its temperature; thus preventing the gradual heating of the wood floor or beams below, which takes place through a solid slab even of considerable thickness.
>
> The air spaces may be secured by using hollow tile placed end to end: or by imbedding wrought or sheet iron pipes (say 2 inch diameter, or larger) in a layer of concrete. The air spaces should run parallel to the **short** dimension of the slab.

If the stove, range, etc., is raised at least 6 inches above the floor and such air space is not enclosed, then the fireproof floor layer may be reduced to not less than 2 inch solid thickness, without air spaces, provided it is covered with sheet metal.

Every stove or range not more than 16 square feet in horizontal area and not having a flame at the bottom shall, if placed on a combustible floor, be raised at least 6 inches above the floor, and such air space shall not be enclosed. Such floor shall be protected with a stove board of sheet metal or asbestos, projecting at least one foot on all sides.

> **Note.** A double-shell heating furnace or stove, located in the room which it is designed to heat, is considered a "stove."

Order 5214. Protection of Walls and Ceiling. No boiler, furnace, oven, stove, or range, whether encased or not, shall be placed less than 24 inches away from any non-fireproof wall, partition or ceiling; except that such distance may be reduced to 12 inches if the wall, partition, or ceiling is protected with at least ¼ inch asbestos board covered with galvanized sheet metal, or with equivalent protection as specified in order 5112.

For stoves and ranges less than 16 sq. ft. in area the above distances may be reduced one half.

The top of every boiler, furnace or oven, shall be covered with asbestos, sand, or other heat resisting material, or the required distance above same shall be increased 100 per cent.

Any non-fireproof ceiling above a stove or range more than 16 square feet in horizontal area, shall be protected by a metal hood, which shall be at least 6 inches clear distance below the ceiling and shall project at least one foot (or to the wall) on all sides. The hood shall have a ventilating pipe placed and protected the same as required for a smoke pipe, and connected with a chimney flue.

SECTION 7. SMOKE PIPES.

Order 5215. No metal smoke pipe shall pass through any combustible roof or floor or any combustible outside wall, or outside window or door.

Every smoke pipe passing through a non-fireproof partition shall be encased with incombustible material at least 4 inches thick or with a double safety thimble made of two concentric rings of sheet metal with at least one inch open air space between and with outer ring covered with at least ¼ inch asbestos.

> **Note.** The double thimble is of no value unless it is kept free from dirt. The best protection is a casing of solid masonry, with ¼ inch space between the masonry and the pipe.

No part of any smoke pipe shall be placed nearer to any non-fireproof partition or wall than the diameter of the pipe, nor nearer to any non-fireproof ceiling than one and one-half times the diameter, and the minimum distance in either case shall be 12 inches; but the above distances may be reduced by one-half, if the wall or ceiling is covered with not less than ¼ inch asbestos board covered with galvanized sheet metal, or with equivalent protection as specified in order 5112.

SECTION 8. STEAM PIPES.

Order 5216. No steam pipe shall be placed within one inch of any woodwork. Every steam pipe passing through a combustible floor, ceiling or partition, shall be protected by a metal tube one inch larger in diameter than the pipe, and shall be provided with a metal cap. All wooden boxes or casings enclosing steam pipes, or wooden covers to recesses in walls in which steam pipes are placed, shall be lined with metal.

> **Note.** A careful investigation has shown that steam pipes in contact with wood or similar material form a real fire hazard. There are a large number of cases on record where steam pipes, even under low pressure, have gradually caused the formation of charcoal and eventually a fire has resulted. The fatal Collinwood school fire probably started in this way.

SECTION 9. HOT AIR PIPES AND REGISTERS.

Order 5217. Every hot air pipe contained in or passing through a combustible partition shall be placed inside another pipe arranged to maintain a ½-inch air space between the two pipes on all sides; or the pipe shall be securely covered with ½-inch of corrugated asbestos. The bend at the bottom of the vertical pipe shall be kept at least 2 inches from any woodwork.

> **Note.** Where a hot air pipe is placed in a 4 inch partition, metal lath over the pipe is recommended.

Every hot air furnace shall have at least one register without valve or louvres.

All register boxes shall be of metal and shall be double; the distance between the two shall be not less than 1 inch; or they may be single if covered with asbestos not less than ⅛ inch in thickness, and if all woodwork within 2 inches is covered with tin.

SECTION 10. CHIMNEYS.

Order 5218. Construction and Foundation. Every chimney shall be built of brick or other fireproof material. No chimney shall rest upon a flooring of wood nor shall any wood be built into or in contact with any chimney. The foundation of every chimney, flue, or stack, shall be designed and built in conformity with the requirements for foundations of buildings. In no case shall a chimney be corbeled out more than 8 inches from the wall, and in every such case the corbeling shall consist of at least five courses of brick. Portland cement mortar shall be used above the roof line.

Order 5219. Minimum Thickness and Height. Every non-metallic chimney shall have walls at least 6 inches thick, unless a terra cotta, fire clay, concrete or other approved flue lining is used for the full height of the chimney, in which case the walls shall not be less than 4 inches thick. No smoke flue shall be less than 8×8 inches.

The top of every chimney shall be at least 5 feet above the top of the building of which it is a part, if the roof is flat, or at least 2 feet above the ridge if the roof is pitched. Every chimney shall be provided with a cleaning-out door at its base.

Order 5220. Flues of More than 260 square inches. Chimneys with flues larger than 260 square inches shall have surrounding walls not less than 8 inches thick. The top of such a chimney shall be at least 8 feet above the roof.

Order 5221. Minimum Thickness to be Increased. Every chimney shall be designed throughout (the above minimum thicknesses being increased where necessary) in accordance with the requirements for the structural design of buildings and with the best engineering practice.

Order 5222. Metallic Chimneys. No metallic chimney shall pass through any non-fireproof floor, ceiling, or roof, unless encased or lined with brick or other fireproof material of the same character and thickness as prescribed for non-metallic chimneys; or in place thereof, where such metallic chimney passes through the roof only, the chimney may be separated from the roof by a 12-inch air space.

Order 5223. Wind Pressure. Every chimney shall be designed to withstand a wind pressure of at least 30 pounds per square foot. In circular chimneys such pressure shall be assumed to act over not less than one-half of the diametral area.

> **Note.** Metal chimneys held by cable guys should have at least four (preferably five) guys. The following example will illustrate the size of cables needed.
>
> Assume a chimney 70 feet high and 30 inches in diameter; guys attached 20 feet below top of chimney; slope of guys, 30 degrees with the horizontal (that is, guys reach the ground about 85 feet from the chimney). The guys should then be not less than one-half inch galvanized cables or two sets of 3/8 inch cables could be used. Proper anchors must be provided which will develop the full strength of the cable.

It is important that guys be so arranged that they will not become weakened by chafing. If the guy is fastened to an eyebolt it should be protected by a steel shield which will take the wear.

SECTION 11. LIGHTS.

Order 5224. Oil lamps shall not be used when gas or electricity is available, except in private apartments.

Gas and oil lights shall be placed at least 6 feet above the floor level, at least one foot from any combustible partition or wall, and at least 3 feet below any combustible ceiling unless properly protected by a metal hood. Every such light shall be rigidly supported. In aisles and public passageways, every such light shall be protected by an incombustible guard unless the light is at least 6 feet 6 inches above the floor.

> **Note.** Especial care should be taken to prevent curtains or draperies from coming into contact with a flame. Gas and oil lights should be kept at least two feet away from any door or window where curtains are used.

Every gas supply main shall have a service cock outside of the building, so placed and maintained that it can be shut off at any time without entering the building.

See also orders 5410, 5533–5, 5714.

> **Note.** Most large cities now require a specially designed cock which does not become clogged with rust or ice, and which can easily be located and shut off by the firemen. This is very desirable as many small fires have become serious through the breaking of gas pipes in the building.

SECTION 12. ELECTRICAL WORK.

Order 5225. All electrical work shall conform to the "1913 National Electrical Code" (on file at the office of the Industrial commission) except where the same conflicts with any order of the Industrial commission.

See also order 5448 (moving picture booths).

> **Note.** Conduit work is strongly recommended for schools, public halls, hotels, etc.

PART IV.

STRUCTURAL DESIGN

Note. Only the most general features of structural design are touched on in this code. Detailed requirements may be adopted by cities if they desire. Such details are beyond the scope of this code and would be of no particular benefit. "Rules cannot produce or supersede judgment; on the contrary, judgment should control the interpretation and application of rules," whether the rules are general or detailed.

Either safety or economy, and often both, will be sacrificed unless both the designer and the builder have a competent knowledge of building construction in general and of the particular kind of construction which is being used.

Such details as are given in the following orders are typical, not restrictive. The Industrial commission will, on application, approve any other type of design which affords equal strength and security in accordance with standard practice. See under "Appeals," p. 5.

SECTION I. FLOOR AND ROOF LOADS.

Order 5300. The minimum stresses to be resisted by any structure shall be calculated by adding to the weight of the structure, called dead load, the following superimposed live loads uniformly distributed in pounds per square foot of horizontal area.

Theaters, Assembly Halls, and other places of assemblage:—

Auditorium with fixed seats	70
Lobbies, passageways, stairways and auditoriums or places of assemblage without fixed seats	120
Dance halls	120
Theater stage	150

School Buildings, Libraries, and Museums:—	
Class rooms and rooms for similar use	60
Corridors, laboratories, and similar public parts of the building	80
Hotels, Apartment and Tenement Houses, Clubhouses, Hospitals, and Places of Detention:—	
Private rooms and apartments	50
Public corridors, offices, lobbies, dining rooms, etc.	80
Office Buildings:—	
First floor	100
Upper floors	60
Stables	80
Grand stands	100
Garages	100
All stairs	100
Workshops, factories and mercantile establishments	100

In warehouses, workshops, factories and mercantile establishments used for the sale, storage or manufacture of heavy merchandise or machinery the floors shall be designed to carry all loads safely, including an allowance of at least 25 per cent for vibration where such occurs.

Roofs	30
Sidewalks	150

In any building where the floor load on any floor is taken as more than 150 pounds per square foot, the sidewalk load shall be taken equal to the maximum floor load.

The foregoing floor loads (but not the roof or sidewalk loads) may be decreased by 20 pounds in buildings of fireproof construction.

Note. This reduction is permitted because (1) a fireproof floor suffers little or no deterioration; (2) a fireproof floor is not weakened by a fire below; (3) the greater dead load of a fireproof floor means that any accidental overload is a smaller proportion of the total dead and live load.

Partial and eccentric loading shall also be provided for.

The joists, beams, girders, columns, and walls supporting the roof shall be designed to carry the full loads.

Floor girders and trusses over 30 feet long shall be designed to carry not less than 85 per cent of the live load besides the dead load; except that in hotels, apartment and tenement houses, hospitals, club houses, and office buildings they shall be designed to carry not less than 75 per cent of the live load besides the dead load.

In a factory, store, warehouse or similar commercial building, the live load to be supported by walls, columns and foundations, shall be assumed at not less than 85 per cent of the full live load of the top floor, 80 per cent of the next lower floor and 75 per cent for each succeeding lower floor.

In all other buildings the live loads to be supported by walls, columns, and foundations, shall be assumed at not less than 85 per cent of the full live load of the top floor and 5 per cent less for each succeeding lower floor until a ratio of 50 per cent is reached, which shall be used for all succeeding lower floors.

SECTION 2. WIND PRESSURE.

Order 5301. Every building shall be designed to resist a horizontal wind pressure of 30 pounds for every square foot of exposed surface, in addition to the dead loads and the live loads specified above.

If the overturning moment due to wind pressure exceeds 75 per cent of the moment of stability of the structure due to dead load only, the structure shall be anchored to its foundations, which shall be of sufficient weight to insure the stability of the structure; and sufficient diagonal bracing or rigid connections between uprights and horizontal members shall be provided to resist distortion.

The overturning moment may be disregarded in a structure less than 100 feet in height if the height does not exceed twice the width.

When the stress due to wind in any member is not greater than 50 per cent of the stress due to the dead and live loads, it may be neglected. When the wind stress is greater than 50 per cent of the dead and live load stresses, then the sum of all these stresses shall not exceed 150 per cent of the stresses hereinafter provided.

SECTION 3. FOUNDATIONS.

Order 5302. The permissible loads on natural earth shall not be more than the following, in tons per square foot:

Quick sand and alluvial soils	½
Soft clay	1
Ordinary clay and sand together in layers, wet and spongy	2
Clay or fine sand, firm and dry	3
Sand, compact and well cemented	4
Gravel and coarse sand, well packed	5
Hand pan or shale	6

The maximum load on a timber pile shall not exceed 500 pounds per square inch, and shall be determined by the following formula:

$$L = \frac{2WH}{S + {}^{1}/_{10}} \text{ for steam hammer.}$$

$$L = \frac{2WH}{S + 1} \text{ for drop hammer.}$$

in which formula

L = safe load in pounds.
W = weight of hammer in pounds.
H = fall of hammer in feet.
S = penetration under last blow in inches, assumed to be sensible at an approximately uniform rate.

SECTION 4. MASONRY CONSTRUCTION.

Order 5303. Unit Stresses. The following unit compressive stresses (pounds per square inch) shall not be exceeded:

Kind of Mortar	Lime. 1:3	Lime and Portland Cement. ½: ½: 3	Portland Cement. 1: 3
Standard common brick (crushing strength 1800)	100	125	175
Hard or select brick (crushing strength (3000)	150	180	270
Rubble, well bonded	80	100	150
Hollow tile or concrete blocks (see order 5309), gross area			60
Concrete—See order 5312.			

For any other type of masonry the unit stress shall be calculated on the basis of a factor of safety of 10 or more, in accordance with standard practice.

Order 5304. Brick Bearing Walls. For all non-fireproof buildings except office buildings and buildings of the apartment house and hotel class, the outside, party, division and other bearing walls shall be not less than 12 inches thick in the upper two stories increasing four inches in thickness for each two stories (or fraction) below, except as hereinafter provided; no such two story height shall exceed 30 feet. But the first story side walls of a three story building may be 12 inches thick if laid in Portland cement mortar and if the second floor joists are supported by wall hangers.

For all fireproof buildings, and for non-fireproof office buildings and buildings of the apartment house and hotel class, the outside, party, division and other bearing walls shall be not less than 12 inches thick in the upper three stories, increasing 4 inches in thickness for each 3 stories (or fraction) below, except as hereinafter provided; no such three story height shall exceed 45 feet.

A building not more than three stories in height may have 8 inch walls in the upper story, provided such story is not more than 10 feet high in the clear, and the span is not more than 20 feet, and the wall is not more than 60 feet long between cross walls, offsets or pilasters. But no such 8 inch wall shall serve as a party wall.

> **Note (a).** To secure proper protection against a severe fire it is recommended that division and fire walls, and outside walls of fireproof or mill buildings, be made at least 12 inches thick of brick or plain concrete, or of reinforced concrete as described in order 5315.
>
> **Note (b).** In the case of long spans or heavy floor loads, the thickness of walls must be increased if necessary so that the allowable unit stresses will not be exceeded.

Every wall shall be bonded with header courses extending through the wall at intervals no greater than every sixth course.

If any horizontal section of any bearing wall shows more than 40 per cent reduction of area on account of flues, openings or recesses, the wall shall be proportionally increased in thickness.

Order 5305. Curtain Walls. Curtain walls supported at every floor level shall be not less than 8 inches thick, provided the vertical height between beams is not more than 12 feet. For the first story the unsupported height may be not more than 18 feet provided the pilasters or columns are not more than 20 feet apart. See note (a), preceding order.

All other walls shall be not less than 12 inches thick.

Order 5306. Stone Walls. Stone walls shall be 4 inches thicker than required for brick walls and shall be similarly bonded.

Order 5307. Stone or Terra Cotta Facing. Stone facing not less than 4 inches thick, and architectural terra cotta which extends not less than 4 inches into the wall and which is filled solid with concrete or with brick and mortar, may be considered as part of the required thickness of a wall if substantially bonded to the backing as required for brickwork. No such wall shall be less than 12 inches thick.

Order 5308. Hollow Walls. In all walls that are built hollow, the same quantity of material shall be used as if they were built solid, and the parts of such hollow wall shall be connected with proper ties placed not more than 24 inches apart.

Order 5309. Hollow Building Blocks. In buildings not over three stories and not more than 45 feet high, hollow tile or concrete blocks may be used for outside walls and inside bearing walls, as well as for nonbearing partitions. Such blocks (except for nonbearing partitions) shall have an ultimate compressive strength of not less than 700 pounds per sq. in. of gross area. In computing the gross area, no deduction shall be made for hollow spaces.

> **Note.** Hollow tile should be of shape and material especially suitable for outside walls and should have undergone tests to prove its fire and weather resisting qualities; such walls should be further protected with ¾ inch of cement plaster on the outside. Concrete blocks should be made of good coarse aggregate, with at least 15 per cent of good Portland cement, properly mixed, moulded, and cured. With fine sand more cement is necessary. Hollow tile or concrete blocks of inferior quality will often not withstand weather or fire and should not be used for outside or bearing walls.

The hollow spaces shall not exceed 52 per cent in the case of terra cotta of clay tile, or 33 per cent in the case of concrete blocks. The absorption shall not exceed 10 per cent in 48 hours.

Such walls shall be laid in Portland cement mortar; hollow tile if laid with cells vertical shall have all horizontal beds reinforced with metal fabric. The thickness of such walls shall be the same as required for brick walls.

Brick facing may be considered as part of a hollow tile or concrete block wall (or vice versa) if the two materials are properly bonded with header courses of brick not more than 12 inches apart vertically.

> **Note.** This requires a size of tile which will work out properly with the brick courses. A tile 12 inches high is not suitable for bonding with brick of the usual size.

Order 5310. Parapet Walls. All exterior, division and party walls of non-fireproof buildings shall have parapet walls not less in thickness than the wall below, carried to 3 feet above the roof and capped with incombustible material.

Order 5311. Recesses. Recesses for water, sewer or other pipes shall not be deeper than one-third the thickness of the wall and the recesses around such pipes shall be filled up with solid masonry for a space of one foot at the top and bottom of each story.

Order 5312. Old Walls. Walls heretofore built as party walls but which are not in accordance with the requirements of this section may be used if in good condition provided the height of the same be not increased.

In case it is desired to increase the height of an existing party or independent wall, which is less in thickness than required under this section, the same shall be done in one of the following ways:

(1) By a lining of brick work, supported on a proper foundation, and forming a combined thickness with the old wall of not less than 4 inches more than the thickness required for a new wall; no lining shall be less than 8 inches in thickness; all lining shall be laid up in cement mortar, and thoroughly anchored to the old wall with suitable iron anchors, placed not over 2 feet apart, the old wall being first cleaned of plaster or other coating; or

(2) Such old wall may be increased in height if the new live and dead loads are uniformly distributed over the entire old wall by means of a distributing girder and

if the total load does not exceed the allowable unit stresses; or

(3) The new wall may be carried by steel or concrete columns.

SECTION 5. CONCRETE CONSTRUCTION.

Order 5313. Unit Stresses and Reinforcement. The following unit stresses (pounds per square inch) shall not be exceeded.

Reinforced Concrete, 1:2:4 mix:—

Compression in concrete, extreme fiber, (assuming a straight line stress distribution)	700
Tension in concrete	none
Compression in steel—15 times the compression in concrete at the same point.	
Tension in steel	16,000
Bond between concrete and steel	80
Shear in concrete	40
Compression on net core area of concrete column, with longitudinal and transverse reinforcement each equal to at least 1 per cent of the core volume	800
Compression on net core area of a similar column but with concrete of a 1:1½:3 mix	900
Compression on net core area of a column with less reinforcement than the above	500

Plain Concrete:—

	Compression.	Shear.	Tension due to bending.
1:2:4 mix	400	40	35
1:2½:5 mix	300	35	30
1:3:6 mix	250	30	25

Note. The foregoing are maximum stresses, suitable for concrete which will develop a crushing strength of at least 2,000 pounds per square inch in 28 days, with a 1:2:4 mix. Where fine sand (very common in Wisconsin) or soft stone is used, the stresses should be decreased or the proportion of cement increased. The following table indicates what strength may be expected with different aggregates, with good coarse sand and good workmanship:

Aggregate	1:1:2	1:1½:3	1:2:4	1:2½:5	1:3:6
Granite, trap rock	3300	2800	2200	1800	1400
Gravel, hard limestone and hard sandstone	3000	2500	2000	1600	1300
Soft limestone and sandstone	2200	1800	1500	1200	1000
Cinders	800	700	600	500	400

Joint Committee on Concrete and Reinforced concrete.

The minimum longitudinal reinforcement of a column or beam shall be four ½ inch round rods. The minimum transverse reinforcement of a column or beam shall be the equivalent of ¼ inch round rods, averaging not more than 12 inches apart. The steel shall be protected by at least 1½ inches of concrete for columns, one inch for beams, and ½ inch for slabs; but this protection shall not be less than the diameter of the rod in any case. In any column longer than 15 times its least diameter the unit stresses shall be properly decreased. The transverse reinforcement shall not be considered in calculating the strength of a column.

Every concrete structure shall be designed in accordance with this code and with the rules and principles of standard practice.

> **Note (a).** For proper fire-resistance the protection of reinforcement is recommended to be at least ½ inch greater than required above.
>
> **Note (b).** "Standard practice" is well illustrated in the report of the Joint Committee on Concrete and Reinforced Concrete.
>
> See the note on page 43. "The use of concrete and reinforced concrete involves the exercise of good judgment to a greater degree than for any other building material."

Order 5314. Materials and Supervision. Only Portland cement shall be used which conforms to the Standard Specifications of the American Society for Testing Materials in force Oct. 1, 1914. (Furnished on request.)

Steel shall be used for reinforcement which shall conform to the Standard Specifications of the American Society for Testing Materials in force Oct. 1, 1914. (Furnished on request.)

The supervision required by order 5200, includes, in the case of concrete structures, a close personal supervision by an experienced superintendent or inspector of the placing of reinforcement, mixing and placing of concrete, and removal of falsework or forms. Especially close supervision is necessary when the temperature falls below 40° F.

Order 5315. Concrete Walls. Plain concrete walls of 1:3:6 mix or better, may be built of the same thickness as required for brick walls. Basement walls of 1:2½:5 mix or better, may be built 4 inches less in thickness than required for brick walls but not less than the wall above.

Concrete walls may be of less thickness than required for brick walls if properly reinforced in accordance with the preceding orders. If such a wall serves as a required division or fire wall, or as the outside wall of a building which is required to be of fireproof or mill construction, such wall shall be of 1:2½:5 mix or better, not less than 6 inches thick, and reinforced with steel weighing not less than ½ pound per sq. ft., properly distributed. Such thickness and reinforcement shall be increased where necessary in accordance with standard practice.

SECTION 6. STEEL AND IRON CONSTRUCTION.

Order 5316. The following unit stresses (pounds per square inch) shall not be exceeded:

	Rolled Steel	Cast Steel.	Wrought Iron.	Cast Iron.
Tension on net section	16,000	16,000	12,000	....
Compression on gross section (max.) (See formula below)	12,000	12,000	10,000	8,000
Tension on extreme fiber	16,000	16,000	12,000	3,000
Compression on extreme fiber	16,000	16,000	12,000	10,000
Extreme fiber of pins	25,000	....	....	....
Shear:				
Pins and power driven rivets	10,000	....	....	....
Hand driven rivets	8,000	....	....	....
Machine bolts	7,000	....	....	....
Rolled steel shapes	12,000	....	....	....
Plate girder webs, net section	10,000	....	....	....
Brackets	....	....	....	2,000
Bearing:				
Pins and power driven rivets	20,000			
Hand driven rivets	16,000			
Machine bolts	14,000			

Compression:

Steel	$17{,}100 - 57\frac{L}{R}$
Wrought iron	$12{,}000 - 60\frac{L}{R}$
Cast iron	$10{,}000 - 60\frac{L}{R}$

Where L = length in inches,
R = radius of gyration in inches.

Every steel or iron structure shall be designed in accordance with this code and with the rules and principles of standard practice.

All steel or iron shall conform to the standard specifications of the American Society for Testing Materials in force Oct. 1, 1914. (Furnished on request.)

SECTION 7. WOOD CONSTRUCTION.

Order 5317. Unit Stresses. The following unit stresses (pounds per square inch) shall not be exceeded:

	Tension.		Compression.		Transverse.	Shear.
	With grain.	Across grain.	With grain.	Across grain.	Extreme fiber.	With grain.
White oak	1,200	125	1,100	500	1,500	150
White pine	700	50	900	200	1,000	80
Long leaf yellow pine	1,200	60	1,500	350	1,700	150
Short leaf yellow pine	1,000	50	1,100	300	1,400	100
Douglas fir	1,000	50	1,300	3 5	1,600	110
Norway pine	800	50	1,000	250	1,200	100
Eastern spruce and fir	800	50	800	200	1,000	80
Hemlock	600	....	900	200	700	80

The stress in compression members shall not exceed $C\left(1 - \frac{L}{60D}\right)$ where

C="compression with grain"
L=length in inches
D=least width in inches.

Note. The above are maximum stresses, suitable for timber which is free from injurious defects and of sufficient density.

Defects include decay, knots, shakes, checks, etc. Decay is dangerous because it tends to spread and because it is difficult to determine the extent to which the timber is weakened. Knots and cross grain in the center half of beams near the bottom edge are especially serious. Deep checks and ring shakes are of importance when they occur in the middle half of the height of the beam or when they run diagonally across the faces; for beams containing such checks, the allowable stress in horizontal shear should be decreased.

The density of the wood is important because the strength of timber increases with the density; this in turn is in proportion to the per cent of "summerwood" (i. e. the hard, dark part of the ring). In yellow pine and Douglas fir the summerwood should form at least 25 per cent of the total if the above stresses are to be used.

These stresses should be decreased at least 20 per cent for timber exposed to moisture.

For further details on the strength and grading of timbers, see Bulletin 108 and other publications of the U. S. Forest Service.

Order 5318. Stud Partitions. Studs in a bearing wall shall be not less than 1⅝ × 3⅝ inches, with the 3⅝ inch dimension at right angles with the plane of the wall. Wooden stud partitions in any building of more than two stories, shall not pass through from floor to floor; all bearing partitions and all stud partitions directly over each other shall run down between the floor beams or joists and rest upon plates, beams or girders below, and shall have the studding filled in solid with incombustible material between the uprights and around all pipes to the underside of the flooring.

Outside studding walls of such buildings shall be similarly fire stopped at each floor level, except that such incombustible material may be supported by blocks cut in between the studs. In such case the studs need not be cut at each floor level.

Non-bearing stud partitions shall have plates at top and bottom, equal in width to the studs. No lath shall extend through from room to room.

For "semi-fireproof" stud partitions see order 5112.

Order 5319. Furring for Walls. When walls are furred, unless the wall between joists is built out to face of lath, there shall be a continuous horizontal strip placed close to the joists at top and bottom; and before the plastering is done, the wall shall be plastered with a coat of mortar at least 6 inches wide and of the full thickness of the strip, just above or below each horizontal strip. Wooden lath or furring shall not be used in any building of fireproof or mill construction.

Order 5320. Floor and Roof Beams. The ends of all wooden floor or roof beams or joists which rest on a masonry wall shall enter the wall to the depth of 4 inches, unless wall hangers are used, or unless the wall is properly corbeled out 4 inches, in which case the corbeling shall extend to top of joists.

Walls shall be anchored to the floor and roof construction with iron or steel wall anchors placed not more than 8 feet apart.

The ends of all such beams or joists shall be so shaped or arranged that in case of any deflection, or breaking, they may fall out without doing much injury to the brick wall. All joists entering any brick or stone wall shall be splayed approximately 3 inches shorter at top edge.

No wooden beam or other timber shall be built into a party wall nearer than 2 inches to the center of the wall.

PART V.

FACTORIES, OFFICE AND MERCANTILE BUILDINGS.

The requirements of the following sections apply to buildings of this classification only.

For other general requirements see Parts I to IV.

SECTION 1. CLASSIFICATION.

Order 5400. Under this classification are included all factories and workshops (including all places where manual labor is employed), office buildings, telegraph and telephone offices, mercantile establishments where commodities are bought or sold, restaurants, warehouses, railroad stations, and exhibition buildings.

SECTION 2. EXITS.

Order 5401. Type of Exits Required. At least one-half of the exits hereinafter required, in building of more than one story, shall be exterior or interior enclosed stairways (orders 5115–5119), except that in two-story buildings such stairways need not be enclosed. The remaining exits shall be either such stairways, or horizontal exits (order 5120); or fire escapes (orders 5121–5131) may be used as exits from floors which are not more than 60 feet above grade, and also from floors which are not more than 90 feet above grade in the case of fireproof office buildings or fireproof buildings where such floors are used for storage only. Every fire escape which accommodates more than 50 persons on any floor above the second shall be a "B" fire escape. Every building which accommodates more than 50 persons above the second floor shall have at least two exits other than fire escapes, excepting fireproof office buildings and other fireproof buildings whose contents are entirely or almost entirely incombustible, providing such building does not exceed 7000 square feet in floor area at the third floor.

> **Note.** In high buildings it is recommended that one exit be an exterior enclosed stairway.

One stairway may serve as an exit for two divisions of a building provided each section has a door opening directly into the stairway encloseure; provided each division shall have at least two means of reaching the ground, either directly or indirectly.

The basement shall have at least one exit leading directly to the outside.

Order 5402. Number and Location. The number and location of exits shall be such that each part of every building will be not more than 75 feet distant from an exit, measuring along public passageways and aisles; but such distance may be increased to 100 feet in the following buildings, provided no hazardous condition exists therein:

(1) Fireproof buildings whose contents are entirely or almost entirely incombustible;

(2) fireproof office buildings;

(3) fireproof storage warehouses with fireproof individual compartments;

(4) fireproof or mill constructed buildings having an approved automatic sprinkler system, provided the contents are not especially inflammable.

Exits shall be so located as to afford the best possible egress.

Order 5403. Minimum Number. Each story of every building or division of a building shall have at least two exits placed as far apart as practicable, with the following exemptions:

(1) First and second story rooms used only for storage and not more than 2,000 sq. ft. in area;

(2) A two story office and mercantile building not larger than 2,000 sq. ft. in ground area; provided the second floor is used only for offices and is not more than 16 feet above the grade; and there is no special hazard in the first floor or basement; and the stairway leads directly to

the outside, is enclosed with fireproof or semi-fireproof partitions, has no connection with the basement, and is not over or near any boiler or furnace unless separated therefrom by fireproof construction.

(3) In any two-story building of this classification, not greater than 2000 square feet in area at the second floor, one inside stairway and one outside covered wooden stairway will be considered to comply with this order. (This forms an exception to order 5131, where outside stairways are required to be incombustible.)

Order 5404. Total Width. In a building not provided with horizontal exits, the total width of stairways shall be not less than the following:

In ordinary or frame buildings, 60 inches per 100 persons.

In fireproof and mill buildings:

	Fire-proof Sprinklered.	Fire-proof not Sprinklered.	Mill Sprinklered.	Mill not Sprinklered.	
... ...	30	50	40	60	in. per 100 persons on 2nd floor.
plus ..	15	25	20	30	" " " " " 3rd "
plus...	12	20	16	24	" " " " " 4th "
plus...	9	15	12	18	" " " " " 5th "
plus...	6	10	8	12	" " " " " 6th "
plus...	3	5	4	6	" " " " " 7th "
plus...	0	0	0	0	" " " " " 8th " and above.
	but in no case shall such total width be less than				
	30	50	40	60	in. per 100 persons on any one floor.

Standard fire escapes (orders 5121–5131) may be substituted for stairways to the extent of not more than one-third of the required total width, subject to the provisions of order 5401.

If horizontal exits (order 5120), are provided for any floor, the number of persons accommodated on such floor may be increased at the rate of 100 persons for each 40 inches width of such exits, provided such increase shall not exceed 100 per cent of the number of persons accommodated by the stairways.

Note. As examples of calculations under this order where the same number of persons are to be accommodated on each floor, the following table shows the number accommodated by two stairways of minimum with (each 44 inches wide):

Frame and ordinary buildings, 147 persons total, above first story.

Fireproof and mill buildings:

Height of building.	Fireproof sprinklered.	Fireproof not sprinklered.	Mill sprinklered.	Mill not sprinklered.	
2 stories	293	175	220	147	persons on each floor.
3 "	195	117	147	98	" " " "
4 "	154	92	116	77	" " " "
5 "	133	80	100	67	" " " "
6 "	122	73	92	61	" " " "
More than 6 stories...	117	70	....	"	" " " "

Where one minimum stairway and one "A" fire escape are provided, take ¾ of the above numbers; subject to the limitations of order 5401.

See the Note on Standard Exits, p. 16.

Order 5405. Capacity of Buildings. In calculating the aggregate width of exits, the capacity of buildings shall be established as follows:

In wholesale mercantile establishments and warehouses, by the number of persons employed therein plus an equal number of customers.

In dining rooms, cafes, and lunch rooms, by allowing 15 square feet of floor per person. If the room accommodates more than 100 persons see order 5501.

In railroad stations, by allowing 15 square feet of floor per person in all parts of the building used by the public; and in private parts of the building, by the actual number of persons engaged therein.

In retail mercantile establishments and exhibition halls, the capacity shall be determined by the architect or owner and it shall be unlawful to accommodate a greater number than the number so established; but such number shall in no case be less than one person per 50 square feet of gross floor area excluding elevators and stairways.

In all other buildings, the capacity shall be determined by the actual number of persons liable to be engaged therein, and no greater number of persons shall be permitted therein. See order 5415.

Order 5406. Exit Doors. Every door which serves as an exit from a room accommodating more than ten persons (as well as doors which are exits from public passageways or stairways) shall be a standard exit door as defined in order 5132; except that such exit door need not swing outward if it accommodates less than 25 persons and is not located at the foot of a stairway, and is not more than four risers above the outside grade.

Order 5407. Passageways. Every public passageway or aisle leading to or from a stairway, fire escape, or exit door, shall conform in width to the rule for width of stairways. (order 5404). The required width shall be kept clear and unobstructed at all times. Where loose chairs or seats would be liable to cause confusion or obstruction, such chairs or seats must be fastened.

SECTION 3. SCUTTLE.

Order 5408. Every building or section of a building two stories or more in height shall have a permanent means of access to the roof from the inside. The opening shall be not less than 20 by 30 inches and there shall be a permanent ladder or stairway leading thereto.

NOTE ON ELEVATORS AND ELEVATOR ENCLOSURES.

See general orders on Elevators issued by the Industrial commission.

SECTION 4. TRAP DOORS AND FLOOR OPENINGS.

Order 5409. Every opening through any floor shall be guarded by a substantial enclosure or rail at least 3 feet high. Floor openings in buildings of more than two stories, unless enclosed with standard fireproof enclosures, shall be protected by standard fire doors, except that two stories may be connected by openings without firedoors if their combined floor area does not exceed the permissible floor area according to order 5202.

SECTION 5. LIGHTING.

Order 5410. All passageways and stairways when used at night shall have lights at the head and foot of each flight of stairs, and at the intersections of all corridors and passageways. Where "B" fire escapes are required, such fire escapes shall be lighted whenever the stairways are required to be lighted. For red exit lights see order 5132.

All gas jets or gas lights in factories or workshops where combustible material is used, shall be properly enclosed by globes or wire cages, or otherwise properly guarded. See also orders 5224–5225.

> **Note.** For further requirements on **LIGHTING**, and also on **VENTILATION** and **TOILET ROOMS**, see the general orders on sanitation issued by the Industrial commission.

SECTION 6. STANDPIPES, FIRE EXTINGUISHERS, AND SPRINKLERS.

Order 5411. Standpipes and Extinguishers. For exterior standpipes see order 5135.

Standard interior standpipes (order 5136) shall be provided in all buildings of more than two stories where inflammable material or any other hazardous condition is present, unless an approved automatic sprinkler system is provided.

> **Note.** The term ''inflammable'' is applied to objects which are not only combustible (i. e., can be burned) but which will burn readily and rapidly.

Wherever water supply of sufficient pressure is not available, two standard fire extinguishers (order 5137) shall be provided on each floor in place of each required interior standpipe.

Order 5412. Automatic Sprinklers. A complete automatic sprinkler system (order 5138) shall be provided in every building of this classification (except office buildings not used for mercantile purposes) where more than 50 persons are employed or accommodated above the third floor, except as provided below.

In every such building where more than 50 persons are accommodated above the second floor, an automatic sprinkler system shall be provided in the basement and sub-basements, except where there is no city water supply.

An office building in which one or more of the lower floors is used for mercantile purposes, shall be classed as a mercantile building, except that no sprinklers will be required in such portions of the building as are used for offices only.

No sprinklers will be required in a building of fireproof construction whose contents are not readily combustible.

See also Notes following order 5138.

SECTION 7. FIRE ALARM.

Order 5413. A proper alarm or gongs, which can be operated from any floor and can be heard throughout the building, shall be provided in every building of more than two stories, except the following (provided no hazardous condition exists therein): (1)fireproof buildings whose contents are (entirely or almost entirely) incombustible; (2) fireproof office buildings; (3) three-story non-fireproof office buildings; (4) fireproof storage warehouses with fireproof individual compartments. Every alarm system shall be tested at least once each week.

SECTION 8. NOTICE OF LOADS AND PERSONS ACCOMMODATED.

Order 5414. Floor Loads. In every factory, workshop, warehouse, or other building where material is piled, notices of a permanent character shall be painted or otherwise prominently displayed, stating the live load (pounds per square foot) which the floor is designed to carry. Such notices shall be in plain letters at least 8 inches high and shall be placed in full view, on each floor, near each stairway and elevator.

> **Note.** In many cases, where floors are used for the storage of some particular material, additional safety may be secured by marking on the wall the height to which the material may be piled without exceeding the safe load.

Order 5415. Number of Persons. In all buildings of this classification where 50 or more persons are accommodated on any floor above the second, notices shall be prominently displayed stating the maximum number of persons on each floor for whom stairways and other exits have been provided according to orders 5401–5405. The size and location of such notices shall be the same as required for floor load notices.

PART VI.

THEATERS AND ASSEMBLY HALLS.

The requirements of the following sections apply to buildings of this classification only.

For other general requirements see Parts I to IV.

For assembly halls in schools, see also order 5614.

SECTION 1. CLASSIFICATION.

Order 5500. Theatres. Under this classification are included all buildings or parts of buildings used for theatrical or operatic purposes which contain a stage with more than 1,500 square feet of scenery including all curtains, or where transient scenery is used; also all buildings or parts of buildings where motion pictures are thrown upon a surface.

Order 5501. Assembly Halls. Under this classification are included all buildings or parts of buildings not included under "theaters," where 100 or more persons assemble for entertainment, instruction, worship or dining purposes.

A private assembly hall is one built in connection with a school, club, church, or society building, and used only by the members for private gatherings, and not rented for public use. Every other assembly hall is a public assembly hall.

SECTION 2. HEIGHT AND CLASS OF CONSTRUCTION.

Order 5502. Theaters. The main entrance or entrances shall not be at a higher level than 3 steps of 6 inches each, above the sidewalk at that point. The floor level at the highest row of seats, on the main floor, shall not be more than 6 feet above the sidewalk level at the main entrance; and the floor level at the lowest row of seats, on said floor, shall not be more than 6 feet below the level of the adjoining sidewalk.

But this requirement shall not apply to a "general purpose building" or village hall, in which the first story is used for village offices, fire department, etc., and the second story is used as an assembly hall and also for motion picture performances; provided

(1) The building shall not be nearer than 20 feet to any other building or lot line;

(2) Not more than 300 persons shall be accommodated in the hall or theater;

(3) The width of exits shall be 50 per cent greater than hereafter provided (i. e., entrance doors and stairways at least 30 inches per 100 persons, emergency exits at least 30 inches per 100 persons):

(4) If the building is not fireproof, then the first story ceiling shall be semi-fireproof, (order 5113), and the stairways shall lead directly to the street and shall be enclosed with unpierced fireproof or semi-fireproof partitions (orders 5109–5112) so that there will be no opening connecting the first and second stories.

All theaters with a seating capacity of more than 600 persons, and all theaters having one or more balconies, shall be of fireproof construction; except that part of the stage floor from the curtain line to the rear wall of the stage, and as wide as the proscenium opening, which shall be of fireproof construction or mill construction protected from below by fireproof material, leaving no hollow spaces.

Theaters with a seating capacity of 600 persons or less and containing no balcony shall be built of fireproof, mill or ordinary construction, except the entire stage and auditorium floor, which shall be of fireproof or mill construction as above.

Order 5503. Assembly Halls. All assembly halls accommodating more than 1,000 persons, and all assembly halls with one or more balconies accommodating more than 150 persons, shall be of fireproof construction. All other assembly halls shall be of fireproof, mill, or ordinary construction, except as follows:

Assembly halls accommodating not more than 750 persons may be built of frame construction provided the following conditions are complied with:

(1) There shall be no balcony.

(2) The highest point of the auditorium floor shall not be more than 5 feet above the grade line at the main entrance.

(3) The floor area of the entire building shall not exceed 6,000 square feet.

(4) The foundation walls and piers shall be of incombustible construction.

(5) The building shall be at least 20 feet away from any other building or adjoining lot line.

Every assembly hall accommodating more than 750 persons shall have the highest point of the main auditorium floor not more than 8 feet above, and in no case below, the grade line at the main entrance; except that in a building of fireproof construction, the highest point of such auditorium floor shall not be more than 15 feet above such grade.

An assembly hall accommodating not more than 750 persons and with not more than one balcony, may be placed in the second story of a building of fireproof construction provided the highest point of the main auditorium floor is not more than 22 feet above the grade at the main entrance of the building.

An assembly hall accommodating not more than 400 persons and with not more than one balcony, may be placed in the third story of a building of fireproof construction, provided the highest point of the main auditorium floor is not more than 35 feet above the grade at the main entrance of the building.

An assembly hall accommodating not more than 400 persons and with no balcony may be placed on the second floor of a building of ordinary or mill construction, provided the highest point of the floor is not more than 22 feet above the grade at the main entrance of the building.

An assembly hall accommodating not more than 200 persons and with no balcony, may be placed in the third story of a building of ordinary or mill construction, provided the floor level is not more than 35 feet above the grade at the main entrance of the building: or may be placed in any story of a building of fireproof construction. See also order 5614.

In the case of a private assembly hall, each of the above numbers of persons may be increased 25 per cent.

SECTION 3. EXPOSURE AND COURTS.

Order 5504. The wall containing the main entrance to any theater or public assembly hall shall abut on a street. The lobby or passageway leading from the main entrance to the main auditorium doors shall not be longer than 50 feet nor longer than three times its width, unless it is enclosed with unpierced fireproof ceiling and floor and with an unpierced standard fire wall on each side. Every theater or public assembly hall seating not more than 300 persons shall also have the rear or one side wall abutting on a street, alley, or open court not less than 5 feet in unobstructed width.

Every theater or public assembly hall seating more than 300 persons shall have at least three walls abutting on streets, alleys, or open courts. The width of every such court shall be at least 7 feet if the total seating capacity is not over 1000 persons, and shall be increased at the rate of one foot per 500 persons additional. But if the building is not more than 80 feet long, and each aisle leads in a straight line to an exit at the rear, then no side court will be required.

Every such court shall lead to a public thoroughfare, either directly, or through a passageway of equal width, not less than 8 feet high, and having unpierced standard fire walls, and fireproof ceiling and floor designed for a live load of at least 150 pounds per square foot. No such court or passageway shall be used for storage or any other purpose whatsoever, except for egress and ingress.

SECTION 4. BUILDINGS USED FOR OTHER PURPOSES.

Order 5505. No sleeping room or apartment shall be placed over a theater unless the entire building is of fireproof construction.

No assembly hall shall be placed over a garage, unless separated therefrom by an unpierced fireproof floor.

Every theater or assembly hall built in connection with or as a part of a building used for other purposes, shall be separated from such other parts of the building by standard fire walls, except in the following cases:

(1) fireproof private assembly halls.

(2) non-fireproof private assembly halls accommodating not more than 400 persons.

(3) halls in fireproof hotels accommodating not more than 400 persons.

(4) in non-fireproof buildings, standard fireproof partitions (order 5109) may be used instead of fire walls.

SECTION 5. CAPACITY.

Order 5506. The capacity of a theater or assembly hall shall be established by the actual number of permanently fixed seats, plus an allowance of one person for every 3 sq. ft. where "standing room" is provided. Such "standing room" shall not include any aisle, passageway, or lobby. Where permanently fixed seats are not provided, the capacity shall be established by allowing 15 sq. ft. of clear floor space per person in halls used as dining or dance halls only, or 6 sq. ft. per person in all other halls. See order 5516.

No greater number of persons than the number thus established shall be permitted in any theatre or assembly hall.

SECTION 6. STAIRWAYS AND OTHER MEANS OF INGRESS.

Order 5507. Width. The width of stairways, passageways, doors, and other usual means of ingress and egress, shall be not less than 20 inches per hundred persons accommodated; but the aggregate width shall not be less than 6 feet.

See also order 5117.

> **Note.** For theatres, the width of regular and emergency exits combined, as required in this order and in order 5512, is 40 inches per 100 persons. This requirement is conservative. The Standard of the National Fire Protection Association is 60 inches per 100 persons. This standard is recommended for theatres where full protection is desired.

Order 5508. Handrails. Stairways and steps which have more than three risers, or which are open on both sides, shall have handrails on both sides. See order 5118.

Order 5509. Risers and Treads. Every stairway used by the public in a theatre or public assembly hall, shall have a uniform rise of not more than 7½ inches and a uniform tread of not less than 10 inches, measuring from tread to tread and from riser to riser; no winders shall be used; there shall not be less than three nor more than sixteen risers in any run. For other stairs see order 5119.

Order 5510. Gallery Stairs. Every balcony or gallery in a theater or public assembly hall, shall have a separate stairway leading to the sidewalk level; and no door from a lower balcony or gallery shall open onto such stairway. Every balcony or gallery accommodating more than 400 persons shall have at least two such stairways. The fly gallery shall have a fireproof stairway to the stage.

Order 5511. Stairway Enclosures. Every stairway in a theater or public assembly hall or non-fireproof private assembly hall shall be an exterior or interior enclosed stairway (orders 5115, 5116), except that no door will be required at the head of the stairway; but in a fireproof building open stairways from the foyer to the first balcony will be permitted.

Every stairway leading directly from the stage to the basement shall be enclosed with 8 inch brick or 5 inch reinforced concrete walls, and shall have standard fire doors protecting all openings into the basement. All basement stairways shall be separated by such walls and doors from any part of the basement which is used for general storage or storage of inflammable material.

No storage closet shall be placed under any stairway.

For emergency stairways see the following orders.

SECTION 7. EMERGENCY EXITS.

Order 5512. Theaters. In addition to the usual means of ingress and egress, emergency exits shall be provided as follows. The minimum total width of such exit doorways, and also of the steps, stairways, fire escapes or inclines leading therefrom, shall be at the rate of 20 inches per 100 persons.

The main auditorium floor shall have a separate exit door for each 300 persons or fraction, with incombustible steps, or incline, to grade. If the doorsill is below grade, an incline shall be used. No part of any incline shall have a rise of more than one foot in five. Each balcony or gallery shall have a separate exit door for each 200 persons or fraction, opening to a separate incombustible outside covered stairway or to a separate "B" standard fire escape or fireproof passageway leading to a street, alley, or open court. All exit doors shall be apportioned as nearly equally as possible on open sides of the building, and shall be so placed as to afford the best possible egress.

> **Note.** Outside covered stairways are recommended instead of fire escapes. Such stairways may be used as regular exits; this adds to the comfort of the audience by

eliminating the usual crowding after every performance, and at the same time decreases the danger of panic.

The stage shall have two exit doors, placed at least as far apart as the width of the proscenium opening; the basement under the stage shall have an exit door placed as far as possible from the usual entrance. Such doors shall have incombustible steps to grade, and the doors and steps shall be at least 3 feet wide. Each fly gallery shall have an exit door at least 2 feet 6 inches wide, located at the opposite end of the gallery from the usual means of ingress, and leading to a standard fire ladder or to a part of the building other than the stage section. Each dressing room section and employe's room shall have an emergency exit with incombustible steps or standard fire escape to grade.

Fire escapes accommodating more than 20 persons shall be "B" standard fire escapes and exits thereto shall be exit doors.

Order 5513. Assembly Halls: Non-fireproof. Every non-fireproof assembly hall shall have (in addition to the requirements of order 5507) a separate emergency exit for each 300 persons or fraction thereof. Each exit shall be standard exit door opening directly from the auditorium to a separate incombustible outside covered stairway or to a separate "B" fire escape. This order shall apply separately to the main floor and to each balcony or gallery which accommodates more than 100 persons.

All exits shall be placed as far apart as possible.

Order 5514. Assembly Halls: Fireproof. For fireproof assembly halls, no emergency exits or fire escapes will be required, provided the regular entrances and stairways have an aggregate width 50 per cent greater than the requirements of order 5507. Or, emergency exits as described in the preceding order may be substituted for any part of this additional width. In any case the total number of exits (including both the usual and emergency exits) shall be at least two where not more than 400 persons are accommodated, and one additional for each additional 400 persons or fraction. This requirement shall apply separately to the main floor and to each balcony and gallery which accommodates more than 150 persons.

SECTION 8. EXIT DOORS.

Order 5515. Every required exit door (whether usual or emergency) shall be a standard exit door (order 5132) and shall also be of width required under orders 5507–5514.

No single door or leaf to a double door, shall be more than 4 feet wide. No two doors shall be hinged together.

No rolling, sliding or revolving door shall be considered as a required exit from any theater or assembly hall, nor shall any such door be permitted in any theater where it would be liable to be used by the public as an exit.

Sills at all exits shall be level and flush with adjacent inside floors, and such floors shall extend without break in the level or gradient for a distance not less than the width of the adjacent aisle.

For exit lights and signs see order 5534.

SECTION 9. SEATS.

Order 5516. All seats, chairs and benches shall be placed not less than 2 feet 8 inches for adults, or 2 feet 6 inches for minors, from back to back measured horizontally. All seats shall average at least 20 inches in width, and no seat shall be less than 18 inches wide. If benches without arms between seats are used, the seating capacity shall be established by allowing one sitting or seat to each 18 inches of length.

All seats, chairs and benches, except chairs in boxes or loggias, shall be securely fastened to the floor; or if the floor is level, the seats and chairs may be fastened together in sections and each section securely fastened to the floor at each end.

> **Note.** Loose chairs or seats must not be used unless a special permit is secured from the Industrial commission, or from the Fire Chief acting as a deputy of the commission.

There shall not be more than 12 seats in a row between aisles, nor more than 5 seats in a row which has an aisle on one side only.

No seat, bench or platform on which seats are placed shall be more than 22 inches in height of riser. No such seat bench shall be nearer the ceiling than 8 feet.

SECTION 10. AISLES AND PASSAGEWAYS.

Order 5517. Width of Aisles. Aisles having seats on both sides shall not be less than 2 feet 10 inches wide at the beginning and shall increase in width toward the exits at the rate of ¼ inch per foot of run; or the aisle may have a uniform width not less than the average width of the foregoing calculation; but no wall aisle shall be less than 3 feet wide and no other straight aisle shall be less than 3 feet 6 inches wide.

Where main aisles are longer than 40 feet, there shall be a cross aisle leading to each required side exit. Cross aisles shall not be less than 4 feet wide.

Order 5518. Passageways and Foyers. Passageways and foyers shall be of width required under order 5507, and in no case less than 5 feet wide, and shall be so designed and apportioned as to prevent congestion and confusion. Passageways and foyers which serve as means of egress (whether usual or emergency) shall be at least equal in combined width to the required width of the stairways, passageways, or doors leading to them.

Order 5519. Inclines and Aisles Steps. To overcome any difference in level between courts, corridors, lobbies or passageways on the ground floor, inclines shall be employed. Inclines shall not exceed one foot of rise to 12 feet of run except in the main aisles of auditoriums, where gradients of one foot rise to 5 feet of run may be used.

Steps in balcony aisles shall extend the full width of the aisle.

Order 5520. Obstruction. All aisles and passageways shall be kept free from camp stools, chairs and other obstructions, and no person except an employe shall be allowed to stand in or occupy any of the aisles, foyers or passageways during any performance or public gathering.

SECTION 11. SCUTTLE.

Order 5521. Over the stage and auditorium there shall be permanent means of access to the roof from the inside. Each opening shall be not less than 20x30 inches and there shall be a permanent ladder or stairway leading thereto.

SECTION 12. ELEVATORS.

Order 5522. All elevators shall be enclosed with standard fireproof enclosures. (See orders on elevators issued by the Industrial commission.)

SECTION 13. PROSCENIUM WALL AND CURTAIN.

Order 5523. Wall. The stage of every theater shall be separated from the auditorium by a brick or monolithic concrete wall at least 12 inches thick. If the wall is more than 16 feet high or more than 40 feet long without proper lateral bracing, it shall be at least 16 inches thick. The wall shall start at the basement floor, except in a fireproof building with unpierced fireproof stage floor. The wall shall extend upward to a roof or floor in a fireproof building; or, in a non-fireproof building, to a point at least 4 feet above the highest adjoining roof.

There shall be not more than two openings (excluding the proscenium opening) in the proscenium wall. Such openings shall not exceed 21 square feet superficial area each, and shall be provided with standard fire doors.

Above the proscenium opening there shall be a fireproofed girder or other fireproof support of sufficient strength to safely carry the load above.

Order 5524. Curtain. The proscenium opening in every theater where scenery is used shall be provided with a rigid fireproof curtain or a curtain of asbestos conforming to the following specifications, or of equivalent approved construction.

Curtains of the rigid steel type shall consist of a rigid steel frame covered on the audience side with not less than No. 16 U. S. gauge sheet steel, and on the stage side with vitrified cellular asbestos boards at least one inch thick. The curtain shall overlap the proscenium wall not less than 12 inches at each side and 24 inches at the top,, and shall slide vertically between rolled steel guides not less than 1/4 inch thick.

Curtains of asbestos cloth shall be substantially woven of asbestos fiber not less than 95 per cent pure and shall weigh not less than 2½ pounds per square yard. All seams shall be lapped not less than one inch and sewed in two rows with not less than $\frac{1}{16}$ inch pure asbestos twine. At the top and bottom of the curtain a 1½ inch (or larger) pipe shall be placed and shall be securely fastened in and covered by the curtain. The curtain shall overlap the proscenium wall not less than 18 inches at each side and 24 inches at the top, and shall be guided at each side by metallic loops or rings sliding on a steel cable. No combustible paint shall be used.

For curtains of any type, the connections between curtain and wall shall be made as nearly smoke-proof as possible. Provision shall be made to prevent the curtain from leaving or binding on the guides under any conditions. No part of a curtain or any of the curtain guides shall be supported by, or fastened to any combustible material.

The hoisting apparatus for the curtain shall be designed with a factor of safety of 8 or more. The device for controlling the curtain shall be simple in design and capable of convenient operation from both sides of the stage and from the fly galleries.

Besides the regular operating mechanism there shall be an emergency device which will allow the curtain to drop by gravity. The device shall be so arranged that it can be easily operated by hand from each side of the stage and from the fly galleries, and also that its operation will be controlled by fusible links placed on each side of the stage and in the fly galleries. and when thus operated it shall descend at its normal rate of speed.

The curtain and its operating mechanism shall be so designed and constructed at all points, whether specifically mentioned or not, as to form an efficient and reliable barrier against fire and smoke, according to the best practice.

> **Note.** It is recommended that this curtain be raised at the commencement and lowered at the close of each performance.
>
> Rigid steel curtains, insulated with asbestos, are recommended as giving the best protection, especially in large theatres.

SECTION 14. STAGE:—VENTILATOR, etc.

Order 5525. Automatic Ventilators. Every stage which contains moveable scenery shall be provided with one or more automatic ventilators placed near the center and above the highest part of the stage, extending at least 10 feet above the roof, and having a combined area equal to at least 8 per cent of the area of the stage floor. The vertical louvre openings shall be not less than twice the sectional area of the shaft. The ventilator shall be designed and constructed so as to open by gravity, and so as to effectively overcome the effects of neglect, rust, dirt, frost, snow, heat, twisting, or warping of the frame work. The louvres or dampers in the openings shall be held closed by cottom or hemp cords running to the stage floor close to each stage door. Fusible links shall be inserted in each cord: one close to the ventilator, one 10 feet above the stage floor, and one midway between these two.

Order 5526. Stage Vestibules. All entrances to the stage shall be vestibuled in such manner as to protect the curtain, scenery, and auditorium from draughts of air.

Order 5527. Foot Light Trough. The foot light trough shall be made of incombustible material.

Order 5528. Fireproof Paint. All stage scenery, curtains, and decorations made of combustible material, and all woodwork in or about the stage, shall be painted or saturated with some incombustible material or otherwise rendered safe against fire.

SECTION 15. WORK SHOP, STORAGE AND GENERAL PROPERTY ROOMS.

Order 5529. No work shop, storage room or scenery dock, shall be placed above or below the stage or auditorium of any theater, or in any fly gallery. Work shops, storage and general property rooms and scenery docks, shall be separated from the rest of the building by fireproof walls at least 8 inches thick (or 5 inches thick if of reinforced concrete), and by fireproof ceilings and floors; and all openings in such walls, ceilings and floors shall be provided with standard fire doors on each side of the wall.

SECTION 16. DRESSING ROOMS.

Order 5530. The section containing the dressing rooms shall be separated from the stage or other parts of the building, by fireproof walls at least 8 inches thick, (or 5 inches thick if of reinforced concrete); and all openings connecting this section with the stage or other parts of the building, shall be protected by standard self-closing fire doors. The partitions dividing the dressing rooms, and the partitions and ceilings of all passageways from the dressing rooms to the stage, shall be incombustible.

No dressing room nor employes' room shall be placed more than one story below the grade line, and no dressing room shall be placed above or below the auditorium.

SECTION 17. BOILER AND FURNACE ROOMS.

Order 5531. Every boiler or furnace room, including breaching, shall be enclosed with standard fire walls and with fireproof ceiling and floor each designed to carry a live load of at least 150 pounds per square foot; except that in the case of a private assembly hall accommodating not more than 300 persons, the floors and walls of the boiler or furnace room shall be incombustible, but fire doors and fireproof ceiling will not be required.

See also orders 5212–5223, and the following order.

Note. If possible, the boiler or furnace room should not be located below the stage, auditorium, foyer, or exits.

SECTION 18. HEATING AND VENTILATING.

Order 5532. Every theater and assembly hall shall be provided with a ventilating system which will furnish at least 1200 cubic feet of fresh air per hour, for each person accommodated, and which will change the air at least six times per hour, in all parts of the building other than the auditorium. The fresh air shall be taken from the outside of the building and no vitiated air shall be re-heated unless it has been washed by a mechanical air washer of approved design. No floor register for heating or ventilating shall be placed in any aisle or passageway unless such register is reinforced with suitable wrought iron or steel ribs not more than 12 inches apart. Radiators in passageways or auditoriums shall be recessed, or elevated at least 7 feet above the floor.

SECTION 19. LIGHTS.

Order 5533. Oil and Gas. (See also order 5524.) No oil lamp shall be used in or about any stage containing scenery.

No gas lighting of any kind shall be used on any stage containing scenery, nor in any property room, storage room, scene dock or fly gallery, except in localities where electricity is not available. Gas fire used for heating water, etc. shall be enclosed in iron jackets.

Note. For theaters where outside electric current is not available, a private electric plant is strongly recommended.

Order 5534. Exit Lights. Under "exit lights" are included lights over all doors and over the entrances to all stairways and passageways leading from the auditorium, balconies or galleries to streets, alleys, or open courts; and any other lights which may be necessary to lead or direct the audience from the auditorium, balconies, galleries or other public parts of the building to streets, alleys or open courts; also such lights as may be necessary to lead or direct all performers and stage employes (including all persons on or about the stage) to public streets, alleys or open courts.

Exit lights shall be either:

(1) Electric lights, fed independently of the stage lighting and controlled only from the lobby or other convenient place in the front of the building; such control shall be accessible to authorized persons only; this circuit shall not pass through or near the stage or moving picture booth; see order 5535 below: or

(2) Candles, or oil lamps using non-volatile oil and floating wick; such lights shall be properly shielded from drafts and from adjacent woodwork or other combustible material.

> **Note.** The latter type of exit lights is the only type that is absolutely safe against general interruption. If such candles or oil lights are used, the management must of course be particularly careful to see that the lights are properly maintained and lighted before every performance.

Every portion of the theater devoted to the use or accommodation of the public except the general auditorium, also all outlets leading to the streets and including all open courts, passageways, stairways, doors, and fire escapes shall be kept well and properly lighted during every performance and the same shall remain lighted until the entire audience has left the premises.

Every exit light over an exit door, or over the entrance to a stairway or passageway, or other means of egress (whether usual or emergency) shall have a red illuminated sign bearing the word "exit" or "out" in plain letters at least 5 inches high, or a similar sign placed below a red light.

Order 5535. Separate Service. In theaters, and in assembly halls in which the auditorium is not kept lighted during the entire performance or entertainment, there shall be two sources of supply as follows if electricity is used for exit lights:—

Where the source of supply is outside of the building, there shall be at least two separate and distinct services where practicable, fed from separate street mains; one service shall be of sufficient capacity to supply current for the entire building, while the other service shall be at least of sufficient capacity to supply current for all exit lights.

Where only one supply from a street main is available, the feed connection used exclusively for such exit lights shall be taken from a point outside of the main building and outside of the main service fuses.

Where the source of supply is a private plant, within or in connection with the building, an auxiliary service of at least sufficient capacity to supply the exit lights shall be installed from an outside source or from a suitable storage battery.

Every electric switchboard shall be made of incombustible, non-absorbent material and shall be enclosed in a fireproof cabinet.

See also orders 5225, 5548.

SECTION 20. TOILET ROOMS.

Order 5536. Separate toilet rooms in connection with the auditorium shall be provided for males and females. One closet shall be installed for each 100 females or fraction and one closet and one urinal for each 200 males or fraction. The above number of fixtures shall be based upon the maximum seating capacity, assuming the audience to be equally divided between males and females.

Water closets in connection with the stage shall be provided in every theater which accommodates more than 300 persons. There shall be separate closets for males and females.

Separate drinking fountains shall be provided for the stage and auditorium, wherever water supply is available.

See also orders 5205–5211.

SECTION 21. FIRE PROTECTION.

Order 5537. Standpipes. For exterior standpipes see order 5135.

Where water supply of sufficient pressure is available the following standard interior standpipes (order 5136) with lines of 1½ inch hose shall be installed:

Every theater or public assembly hall accommodating not more than 300 persons shall have at least one standpipe in the balcony, one at the rear of the auditorium, one on the stage, and one under the stage.

Every theater or public assembly hall accommodating more than 300 persons shall have at least one standpipe in the auditorium, one in each balcony and gallery, one on each side of the stage, near exit, one in each fly gallery, near stairway, and one on each side of basement under the stage, near exit.

The above lines of hose shall not be more than 75 feet long and where such lines of hose will not reach the extreme parts of such portions of the building, additional standpipes and hose shall be installed. These pipes shall be filled with water at all times while the building is in use.

Order 5538. Fire Extinguishers. Where water supply of sufficient pressure and quantity is not available, and also in private assembly halls where interior standpipes are not provided, standard chemical fire extinguishers (order 5137) shall be provided as follows:

Every theater or assembly hall accommodating not more than 300 persons shall have at least one standard fire extinguisher in the boiler or furnace room, two on the stage, two under the stage, one in dressing room section, two in auditorium, two in balcony and one in box office.

Every theater or assembly hall accommodating more than 300 persons shall have at least two standard fire extinguishers on each side of stage, two in each fly gallery, one in each property room, one in each scene dock, one in every four dressing rooms or less, one in each foyer, one in each toilet room, and one in each auditorium balcony and gallery for each 2,000 square feet of area, or fraction.

All extinguishers shall be properly exposed to view and always accessible.

Order 5539. Automatic Sprinklers. Every theater accommodating more than 600 persons (except theaters used only for motion pictures and having no stage or scenery) shall be provided with an approved automatic sprinkler system (order 5138), to be installed throughout the theater, except in the auditorium, foyers, lobbies, public stairways and passageways, over dynamos and switchboards, and those parts of the stage ventilator which are above the roof line.

Order 5540. Hooks and Axes. Every stage which contains scenery shall be provided with at least one fireman's axe and one 12 foot hook.

Every stage which contains scenery and which is more than 30 feet wide shall have at least one 14 foot hook and one fireman's axe in each fly gallery, and one on each side of the stage, and one fireman's axe on each side of the basement.

All hooks and axes shall be prominently exposed to view and always accessible.

Order 5541. Fire Alarm Box. In cities having a public fire alarm system there shall be a box at each theater or public assembly hall.

> **Note.** A private alarm is recommended as being less liable to cause panic.

SECTION 22. MIRRORS: FALSE OPENINGS.

Order 5542. No false opening giving the appearance of a door or window, where none exists, shall be placed in any part of a theater or assembly hall used by the public.

No mirror shall be placed in any part of a theater or assembly hall used by the general public except in the women's and men's retiring and toilet rooms.

SECTION 23. MOTION PICTURE MACHINES AND BOOTHS.

> **Note.** This section is in accord with the specifications already issued by the State Fire Marshal, except that the size of angle iron is slightly increased. This change is made with the approval of the Fire Marshal.

Order 5543. Definition. By the term "picture machine" as used in this code is meant any device used to project upon a surface moving pictures of any character which an audience is admitted to view.

Order 5544. Construction of Booth. Every picture machine shall, before being operated, be installed in a booth constructed entirely of fire resisting material, including brick, tile, concrete, two inch plaster on metal lath and metal frame, or of sheet iron or asbestos sheathing as specified below. The size of the booth (for one machine) shall be not less than 5 feet by 5 feet by 6 feet high.

> **Note.** Booths at least 6 by 6 by 7 feet are recommended.

Every booth made of sheet iron or asbestos sheathing shall have its frame constructed of not less than 1¼ by 1¼ by 3-16 inch steel angles or tees, spaced not more than two feet apart, properly braced to secure rigidity, and securely riveted or bolted at joints. The sheathing shall be not less than No. 20 U. S. gauge sheet iron or ¼ inch hard asbestos board, securely riveted or bolted to the frame. The floor shall be constructed of the same material as the sides and top, riveted or bolted to the frame, and covered with a rubber or cork matting. No sheet metal booth shall be placed nearer to any combustible partition, wall, or ceiling, than 2 feet.

Order 5545. Door. The door shall be not larger than 2 by 5 feet, and shall either be of the same construction as the booth, or be at least ¾ inch thick and clad with metal not less than No. 28 U. S gauge. The door shall swing outward, and close automatically, either by means of a spring on the outside or by a metal rope and weight. Two metal latches shall be provided, one about 12 inches below the top and the other about 12 inches above the bottom of the door, so connected that one operation opens both latches.

Order 5546. Openings. The openings for the operator's view, or for the picture, shall not be larger than 12 inches square, and shall be provided with a gravity door, of the same construction as specified for the booth, held open by fusible links placed in series, so arranged that one of the links is suspended directly over the film when it is in the slide of the apparatus; or the door shall be so arranged as to be closed, except when held open by pressure of the operator. Such door shall not be blocked or held open in any manner except as here described.

Order 5547. Ventilation. Each booth shall be provided with a metal ventilating pipe not less than 12 inches in diameter, extending outside of the building.

> **Note.** If a 12 inch outlet pipe is impracticable, a smaller pipe may (if approved by the Industrial commission) be used if provided with an efficient rotary power fan.

A fresh air opening shall also be provided near the rear end of the booth, in or near the floor, connecting with a metal duct of not less than 120 square inches area leading from the outside, and having a damper operating automatically by fusible links, and a damper operated at the will of the operator. If a standard fire window is provided not less than 4 square feet in area, connecting with the outside air, and opening not less than one-half, then the ventilating pipes (both inlet and outlet) may be omitted.

Order 5548. Electric Wiring. All electric wiring in the booth shall have an approved slow burning insulation. Each lamp connected with a picture machine shall be provided with a separate switch located within the booth, where there shall also be a switch controlling the lights in the exhibition room.

> **Note.** Motion picture theaters are, of course, subject to all the requirements of Part VI, in respect to lighting as well as in all other respects.

Order 5549. Machine. Every machine shall be provided with feed and takeup reels in metal receiving boxes with riveted or flanged joints. A shutter shall be placed in front of the condenser, arranged so as to be closed except when held open by the operator, or by some other device that will insure the immediate dropping of the shutter when operation of the machine is stopped.

Order 5550. Films, etc. Magazines shall be used for receiving and delivering the films during the operation of the machine. Films not in the machine shall be kept in metal boxes with tight fitting covers when in the booth. No combustible substance of any sort shall be permitted in the booth, except the films used in operation.

> **Note.** It is suggested that, between pictures, a bulletin be thrown on the screen, stating the precautions taken to reduce danger from fire, and giving advice as to the dangers which might arise from panic.

Order 5551. Temporary Booth. Every temporary booth shall be of approved design, conforming as far as possible to the requirements for permanent booths. Every booth used for more than three consecutive performances in one location will be considered a permanent booth.

> **Note.** The Industrial commission suggests that plans of motion picture booths, both permanent and temporary, be submitted for approval.

PART VII.

SCHOOL BUILDINGS, LIBRARIES AND MUSEUMS.

The requirements of the following sections apply to buildings of this classification only.

For other general requirements see Parts I to IV.

SECTION 1. CLASSIFICATION.

Order 5600. Under this classification are included all public, parochial, and private schools, colleges, academies, seminaries, libraries, museums and art galleries; including all buildings or parts of buildings used for the purpose of acquiring knowledge.

SECTION 2. HEIGHT AND CLASS OF CONSTRUCTION.

Order 5601. Maximum Height. No building which accommodates primary or grammar grades, or pupils averaging 14 years old or less, shall be more than three stories high, nor shall the topmost floor level be more than 35 feet above the grade at any outside door.

No building which is used as a high school, or which accommodates pupils averaging 18 years old or less, shall be more than four stories high, nor shall the topmost floor level be more than 48 feet above the grade at any outside door.

Order 5602. Class of Construction. Every building which is more than two stories high, shall be of fireproof construction, except that in a three story building ordinary construction may be used above the third floor.

All other buildings of this classification shall be of ordinary, mill, or fireproof construction; except that a one-story building whose floor level is not more than 4 feet above the grade, may be of frame construction, if it is not within the fire limits of any city or village, and if it is at least 30 feet away from any other building and from any adjoining lot line or opposite alley line.

> **Note.** The laws of the state compel children to attend school, regardless of the wishes of either children or parents. School buildings therefore surely require the highest degree of fire protection. Fireproof construction is strongly recommended for al school buildings. Many such schools have been built at a cost of only about 10 per cent more than for combustible construction. In such a case the saving in fire insurance alone will yield nearly 5 per cent return on the additional cost; when decreased depreciation is considered, it is evident that fireproof construction is a good investment.

SECTION 3. EXPOSURE AND COURTS.

Order 5603. No wall containing windows which light a school or class room shall be less than 30 feet away from any opposite building, structure or lot line, or opposite court wall; except that the distance from such opposite court wall may be reduced to not less than 20 feet provided light rays at an angle of 45 degrees are not thereby obstructed from entering the entire upper half of any such window.

SECTION 4. SUBDIVISIONS AND FIRE STOPS.

Order 5604. Every building of this classification which is built in connection with a building of a lower grade of construction, shall be separated from such other building by standard fire walls, and all communicating openings shall be protected by standard fire doors. If such openings are used as a means of egress, they shall be kept normally open during the occupancy of the building. All rooms or apartments used for general storage, carpenter shops, repairing, paint shops or other equally hazardous purposes shall be enclosed with standard fire walls and fireproof ceilings and floors.

SECTION 5. EXITS.

Order 5605. Number, Location, and Type. The number and location of exits shall be such that, in case any exit or passageway is blocked at any point, some other exit will still be accessible, through public passageways, from every class room, and from every other room used by the public or by the occupants generally.

> **Note.** According to this requirement, every school building, however small, must evidently have at least two exits. Furthermore, there must evidently be an exit at the end of every corridor.

At least one-half of such exits, in buildings of more than one story, shall be stairways (orders 5117–5119). The remaining exits shall be either such stairways, or horizontal exits (order 5120); or fire escapes may be used as exits from floors which are not more than 40 feet above grade. In non-fireproof buildings at least one fire escape or incombustible outside covered stairway shall be provided unless the stairways are enclosed (orders 5115–5116). All fire escapes on buildings which accommodate more than 100 persons above the first floor shall be "B" fire escapes.

In every building which accommodates more than 120 persons above the first floor, there shall be at least two stairways. In buildings of more than two stories, the stairways shall be enclosed as in orders 5115–5116, unless the stairs and the corridor floors are incombustible.

> **Note.** In the case of stairways used by children, the rise should be less than the maximum permitted by order 5119. For primary grades the rise should not be more than 7 inches. Stairs in school buildings should have a handrail on each side. Closets should not be placed below stairways.

Basement stairways which lead to the first floor shall be separated by standard fireproof enclosures (order 5109) from all parts of the basement which are used for general storage or for the storage of inflammable material. One basement exit shall open directly to the outside.

Order 5606. Total Width. The total width of exits from any floor shall be at not less than the following rates, based on the total number of persons accommodated on such floor and on the floors above:

Non-fireproof buildings, 40 inches per 100 persons.

Fireproof buildings, 30 inches per 100 persons. If the stairways are enclosed and an approved automatic sprinkler system is provided in the basement, such width may be reduced as in order 5404.

Standard fire escapes (orders 5121–5131) may be used for not to exceed one-third of the above total widths, subject to the limitations of the preceding order.

The capacity of a school building shall be established by the actual number of seats in rooms where such are used, or by the number of persons accommodated. The capacity of a library, museum, or art gallery shall be established by allowing to each person 100 square feet of the total floor area of the building, excluding stairways and elevators.

Order 5607. Exit Doors. Exit doors shall be as required in order 5132, except that they shall be not less than 2 feet 8 inches wide if used by children under 14 years. The aggregate width of exit doors shall be as required in order 5606. No single door or leaf of a double door shall be more than 4 feet wide. No revolving door shall be considered as a required exit from a building used by persons under 18 years of age.

> **Note.** Single doors are better than double doors for school buildings.

Order 5608. Passageways. Corridors and passageways shall be so designed as to prevent congestion and confusion.

The minimum unobstructed width of corridors and passageways which are used by the public or by the occupants generally shall be determined the same as the width of stairways (order 5606) and shall in no case be less than 4 feet. Corridors and passageways serving as a means of egress shall be at least equal in combined width to the required width of the stairways or passageways leading to them.

SECTION 6. SCUTTLE.

Order 5609. Every building more than one story in height shall have a permanent means of access to the roof from the inside. The opening shall be not less than 20 x 30 inches and there shall be a permanent ladder or stairway leading thereto.

SECTION 7. ELEVATORS.

Order 5610. All elevators shall be enclosed with standard fireproof enclosures. (See general orders on elevators issued by the Industrial commission.)

SECTION 8. ROOMS AND WINDOWS.

Order 5611. Floor Space and Height. The minimum floor space of school or class rooms shall be:

For primary grades, 12 square feet per person.
For grammar grades, 14 square feet per person.
All others, 16 square feet per person.

Note. These are minimum requirements. A more liberal allowance of floor space (16 to 20 square feet per person), is recommended.

All class, recitation and study rooms shall be at least 12 feet high in the clear. Toilet, play and recreation rooms shall be at least 8 feet high in the clear.

See also the following order.

Order 5612. Windows. In study, class, recitation and laboratory rooms, there shall be at least one square foot of glass surface (windows or skylights) for every 6 square feet of floor surface.

Note. One square foot of glass surface for every 5 square feet of floor surface is recommended.

For toilet room windows see order 5207.

Windows shall be placed either at the left or at the left and rear of pupils when seated. The tops of windows (except in libraries, museums and art galleries) shall not be placed more than 8 inches below the minimum ceiling height as established in order 5611.

The width of all class and recitation rooms (measuring at right angles to the glass surface) when lighted from one side only shall not exceed two and one-fourth times the height of the window head above the floor.

All windows shall be placed in the exterior wall of the building; except that halls, corridors, stock and supply closets may be lighted by ventilated skylights or by windows placed in interior walls or partitions. Museums, libraries and art galleries may be lighted by skylights.

See also order 5603.

Note. The object of the above order is to secure proper light in rooms used for long continued studying or reading. In college and university buildings where a literal compliance with this order is impracticable and unnecessary, reasonable modifications in accordance with standard practice will be permitted on application. See under "Appeal", p. 5.

Order 5613. Basement Rooms. No class, recitation, or study room shall be placed in any basement if the floor level of such room is more than 2 feet below the adjoining grade. The walls and floor of every basement room used by pupils or students, shall be waterproof and dampproof.

SECTION 9. ASSEMBLY HALLS.

Order 5614. A room seating or accommodating 100 or more persons is governed by the requirements of Part VI, Theaters and Assembly Halls, except as follows:

No assembly hall in a non-fireproof building used by pupils or students who average 18 years old or less, shall be located above the second story.

The minimum width of any exit doorway used by children under 14 years of age may be 2 feet 8 inches (instead of 3 feet 4 inches); but in any case the aggregate width of such doorways shall be in accordance with Part VI.

Note. It is recommended that assembly halls in schools, especially when used by children under 14, be placed on the first floor so as to avoid the danger of panic.

SECTION 10. SEATS, DESKS, AND AISLES.

Order 5615. Seats, chairs and desks (except those used by teachers) in class recitation or study rooms seating more than 50 persons shall be securely fastened to the floor.

Class and school rooms shall have aisles along all walls.

In primary rooms, intermediate aisles shall be not less than 17 inches, and wall aisles not less than 2 feet 4 inches in width.

In grammar rooms, intermediate aisles shall be not less than 18 inches and wall aisles not less than 2 feet 6 inches in width.

In high school rooms and in all other class and school rooms, intermediate aisles shall be not less than 20 inches and wall aisles not less than 3 feet in width.

Assembly hall seats and aisles shall conform to the requirements for assembly halls (orders 5516–5520).

SECTION 11. BOILER AND FURNACE ROOMS.

Order 5616. Every boiler or furnace room, if not located in a separate building, shall be enclosed (together with breaching) with fireproof floor and ceiling and with solid incombustible walls at least 8 inches thick (or 5 inches thick if of reinforced concrete) with all openings protected by standard fire doors. Such boiler or furnace shall be separated as effectively as possible, either by distance or by partitions and doors, from all stairways leading to the first floor, and especially from stairways which lead continuously to the upper floors.

Note. Boilers and furnaces are strongly recommended to be placed in separate buildings. This will eliminate the most frequent cause of school fires.

SECTION 12. VENTILATION.

Order 5617. All parts of the building generally used by the public or the occupants, except the corridors, passageways and stairways, shall be provided with fresh air at the rate of at least 1,200 cubic feet per person per hour. The fresh air shall be taken from the outside of the building and no vitiated air shall be reheated unless washed by a mechanical air washer of approved design; in such case not less than one-third of the required air shall be taken from the outside.

SECTION 13. TOILET ROOMS.

Order 5618. School buildings shall have the following sanitary equipment:

One water closet for every 20 females or fraction, except for grammar and primary grades, where there shall be one water closet for every 15 females or fraction.

One water closet and one urinal for every 40 males or fraction, except for grammar and primary grades, where there shall be one water closet and one urinal for every 30 males or fraction.

Toilet accommodations for males and females shall be placed in separate rooms with doors not less than 20 feet apart.

A drinking fountain and sink shall be installed in each story and basement, for each 6,000 square feet of floor area, or fraction.

Libraries, museums and art galleries shall have the following sanitary equipment:

One water closet for every 100 females or fraction, One water closet and one urinal for every 200 males or fraction.

The capacity shall be established in order 5606.

See also orders 5205–5211. Where privy vaults are permitted, the building containing the same shall be placed at least 20 feet from any other occupied building.

SECTION 14. STANDPIPES AND FIRE EXTINGUISHERS.

Order 5619. For standard exterior standpipes see order 5135.

In all buildings not provided with interior standpipes, standard chemical fire extinguishers (order 5137) shall be provided in the proportion of one extinguisher to each 2,000 square feet of floor area or fraction in non-fireproof buildings, or one to each 6,000 square feet of floor area or fraction in fireproof buildings; but there shall be at least one fire extinguisher on each floor. All fire extinguishers shall be prominently exposed to view and always accessible.

Note. Automatic sprinklers (order 5138) are recommended for all parts of the basement where combustible material is liable to be stored.

SECTION 15. FIRE ALARMS.

Order 5620. Every building two stories or more in height shall be provided with a proper alarm or gongs which can be operated from any story and can be heard throughout the building. Such alarm system shall be tested at least once a week.

In cities having a public fire alarm system there shall be a box at each school building.

breaching) with fireproof floor and ceiling and with solid incombustible walls at least 8 inches thick (or 5 inches thick if of reinforced concrete) with all openings protected by standard fire doors. Such boiler or furnace shall be separated as effectively as possible, either by distance or by partitions and doors, from all stairways leading to the first floor, and especially from stairways which lead continuously to the upper floors.

> **Note.** Boilers and furnaces are strongly recommended to be placed in separate buildings. This will eliminate the most frequent cause of school fires.

SECTION 12. VENTILATION.

Order 5617. All parts of the building generally used by the public or the occupants, except the corridors, passageways and stairways, shall be provided with fresh air at the rate of at least 1,200 cubic feet per person per hour. The fresh air shall be taken from the outside of the building and no vitiated air shall be reheated unless washed by a mechanical air washer of approved design; in such case not less than one-third of the required air shall be taken from the outside.

SECTION 13. TOILET ROOMS.

Order 5618. School buildings shall have the following sanitary equipment:

One water closet for every 20 females or fraction, except for grammar and primary grades, where there shall be one water closet for every 15 females or fraction.

One water closet and one urinal for every 40 males or fraction, except for grammar and primary grades, where there shall be one water closet and one urinal for every 30 males or fraction.

Toilet accommodations for males and females shall be placed in separate rooms with doors not less than 20 feet apart.

A drinking fountain and sink shall be installed in each story and basement, for each 6,000 square feet of floor area, or fraction.

Libraries, museums and art galleries shall have the following sanitary equipment:

One water closet for every 100 females or fraction, One water closet and one urinal for every 200 males or fraction.

The capacity shall be established in order 5606.

See also orders 5205–5211. Where privy vaults are permitted, the building containing the same shall be placed at least 20 feet from any other occupied building.

SECTION 14. STANDPIPES AND FIRE EXTINGUISHERS.

Order 5619. For standard exterior standpipes see order 5135.

In all buildings not provided with interior standpipes, standard chemical fire extinguishers (order 5137) shall be provided in the proportion of one extinguisher to each 2,000 square feet of floor area or fraction in non-fireproof buildings, or one to each 6,000 square feet of floor area or fraction in fireproof buildings; but there shall be at least one fire extinguisher on each floor. All fire extinguishers shall be prominently exposed to view and always accessible.

> **Note.** Automatic sprinklers (order 5138) are recommended for all parts of the basement where combustible material is liable to be stored.

SECTION 15. FIRE ALARMS.

Order 5620. Every building two stories or more in height shall be provided with a proper alarm or gongs which can be operated from any story and can be heard throughout the building. Such alarm system shall be tested at least once a week.

In cities having a public fire alarm system there shall be a box at each school building.

PART VIII.

APARTMENT HOUSES, HOTELS AND PLACES OF DETENTION.

The following requirements apply to buildings of this classification only.

For other general requirements see Parts I to IV. For rooms which accommodate more than 100 persons, see Part VI, Theaters and Assembly Halls.

> **Note.** This code in no way affects the validity of sections 1636—180 to 1636—201 of the statutes, known as the Tenement House Law for cities of the first class (i. e. Milwaukee). On all points where the requirements of the Tenement House Law are more stringent than the requirements of this code, the Tenement House Law must of course be complied with for buildings in Milwaukee. All requirements of this code which are not covered in the Tenement House Law will apply in Milwaukee the same as elsewhere.

SECTION 1. CLASSIFICATION.

Order 5700. Apartment (Tenement) Houses. Under this classification is included every building or part of a building accupied as the residence of three or more families living independently, or occupied by two such families and also used for business purposes.

Order 5701. Hotels and Places of Detention. Under this classification are included all hotels, lodging and boarding houses, club houses, dormitories, convents, hospitals, asylums, jails and other places of detention, including every building or part of a building used for sleeping or lodging purposes by six or more persons not members of a family.

> **Note.** Where the following requirements refer to "families" or "apartments", the requirement applies to apart-

ment houses; where they refer to "persons" or "rooms", the requirement applies to hotels and places of detention.

SECTION 2. HEIGHT AND CLASS OF CONSTRUCTION AND FIRE STOPS.

Order 5702. Fireproof Construction. Buildings of five or more stories shall be of fireproof construction.

All places of detention where persons are confined by locked doors or barred windows, shall be of fireproof construction.

Order 5703. Ordinary Construction. Apartment houses more than three stories in height, and all other buildings of this classification more than two stories in height, shall be of fireproof, mill, or ordinary construction.

> **Note.** It is strongly recommended that four story buildings be of fireproof construction. See note on cost of fireproof construction, order 5602.

Order 5704. First Floor Fireproof. In three or four story buildings, the first floor and all members supporting the same shall be of fireproof construction; except that in a three-story building which accommodates not more than four families or 30 persons above the first story, the basement ceiling shall be either fireproof or semi-fireproof (order 5113).

Order 5705. First Floor Used for Business Purposes. In a building whose first story is used for business purposes, the first story ceiling shall either be fireproof or semi-fireproof (order 5113).

Order 5706. Room Containing Inflammable Material. Every room or apartment which is used for a carpenter or paint shop, or other equally hazardous purpose, or which contains other equally inflammable material shall be enclosed with fireproof ceiling and floor and with incombustible walls at least 8 inches thick (or 5 inches thick if of reinforced concrete) with all openings protected by standard fire doors.

Order 5707. Corridor and Dividing Partitions. Public passageways shall be enclosed with fireproof or semi-fireproof partitions in all buildings where the stairways are required to be enclosed (order 5710). In such buildings where there is more than one apartment on any floor, such apartments shall be separated by fireproof or semi-fireproof partitions. Where there are more than eight rooms on any floor, they shall be divided by fireproof or semi-fireproof partitions into groups of not more than eight rooms each.

SECTION 3. YARDS.

Order 5708. Behind every apartment house, the rear of which does not abut on an alley or street, there shall be a yard across the entire width of the lot, open and unobstructed from the ground to the sky. The width of the yard behind a two-story building shall be either

(1) At least 5 feet of unobstructed width; or

(2) At least 10 feet from the rear lot line to the building line, of which at least 3 feet shall be unobstructed, and the remainder may be occupied by an open (or screened) porch.

For apartment houses of more than two stories, the unobstructed width of the entire yard shall be increased one foot for each additional story, except in the case of corner lots.

SECTION 4. COURTS AND SHAFTS.

Order 5709. All courts and shafts for light, air, or dumbwaiter, shall be completely enclosed with fireproof or semi-fireproof partitions or walls (orders 5109, 5112) except as provided below. Dumbwaiter shafts shall have fireproof enclosures.

In the case of a semi-fireproof partition enclosing a court or shaft in a building of not more than three stories, the fire-resisting material will only be required on the side of the partition toward the court or shaft.

In a fireproof building, an open well piercing the second (mezzanine) floor only, will be permitted. The mezzanine floor will be considered as a full story.

Walls of outer courts and lot line courts shall be constructed the same as required for outside walls.

For elevator shafts see General Orders on Elevators.

For minimum size, etc., of courts and shafts see orders 5203-5204.

SECTION 5. EXITS.

Order 5710. Number, Location, Type. The number and location of exits shall be such that in case any exit or passageway is blocked at any point, some other exit will still be accessible, through public passageways, from every room or apartment; also that the entrance to each room or apartment will be not more than 50 feet distant from an exit (measuring along public passageways) if in a non-fireproof building, or 75 feet in a fireproof building.

> **Note.** This evidently requires at least two exits from every building (except as in order 5712) and also requires an exit at the end of every corridor.

At least one half of such exits, in buildings of more than one story, shall be stairways (orders 5117–5119). The remaining exits shall be either such stairways, or horizontal exits (order 5120); or fire escapes may be used as exits from floors which are not more than 40 feet above grade.

In three story buildings which accommodate not more than two families or 12 persons above the first floor, the stairways need not be enclosed, if an outside covered stairway or fire escape is provided. In all other buildings of three or more stories, the stairways shall be enclosed as in orders 5115–5116 and there shall be at least two stairways from the uppermost floor to grade.

In all buildings of more than two stories, in which the first story is used for business purposes, at least one stairway shall be enclosed in the first story with an unpierced fireproof enclosure (order 5109) and such stairway shall not connect with the basement.

Every outside stairway shall be covered by a roof. If more than two families or 12 persons are accommodated above the first story, the stringers and other supporting members of outside stairs and platforms shall be of incombustible material; the treads and flooring, if of wood, shall be at least 1⅝ inches thick. If more than four families or 24 persons are accommodated above the first story, the adjoining doors and windows shall be protected as in order 5121.

> **Note.** Outside rear stairways have been found satisfactory on many apartment houses. They serve the purpose of a rear stairway and fire escape combined.
>
> In high buildings one or more exterior enclosed stairways (order 5115) should be provided.

Order 5711. Aggregate Width. The aggregate width of exits shall be as provided in order 5404.

Note. Stairways and doors of minimum width will be

found sufficient to comply with this order except in large hotels.

Order 5712. Exceptions. One stairway only, and no other exit, will be required in a two or three story building which accommodates not more than two families or 12 persons above the first floor, provided;

(1) The first floor is of fireproof construction; and

(2) The stairway and stairhall are fireproof and are entirely separated from the basement and first story by unpierced fireproof floors and partitions, and are enclosed in the second story by a standard fireproof enclosure (order 5109); and

(3) Each apartment or floor has an outside balcony not opening from the stairhall.

The minimum width of stairways and doors which accommodate not more than 6 families or 30 persons, may be not less than 3 feet instead of the widths specified in orders 5117–5132, and such doors will not be required to swing outward.

For other exit door requirements see order 5132.

Order 5713. Passageways. Every public passageway leading from an exit shall be at least as wide as the required width of such exit. Every public passageway leading to an exit shall be at least 3 feet wide. The required width shall be kept clear and unobstructed at all times.

SECTION 6. LIGHTS.

Order 5714. In every building which accommodates more than 4 families or 24 persons, and in every building which accommodates transients, irrespective of their number, and in every hospital, asylum, or other place of detention, the public passageways and stairways and exit doors shall be illuminated from one hour after sunset to one hour before sunrise. This illumination shall include lights at all intersections of passageways, at all exit doors, and at the head and foot of every stairway. The lights at exit doors shall be red lights and shall be accompanied by a sign bearing the words "exit" or "out", in plain letters.

See also orders 5224–5225.

SECTION 7. SCUTTLE.

Order 5715. Every building more than one story in height which accommodates more than 6 families or 30 persons shall have a permanent means of access to the roof from the inside. The opening shall be not less than 20 x 30 inches and there shall be a permanent ladder or stairway leading thereto.

NOTE ON ELEVATORS AND ELEVATOR ENCLOSURES.

See General Orders on Elevators issued by the Industrial commission.

SECTION 8. ROOMS AND WINDOWS.

Order 5716. Size of Rooms. Every sleeping room shall be of sufficient size to afford at least 400 cubic feet of air space for each occupant over twelve years of age, and 200 cubic feet for each occupant under twelve years. No greater number of occupants than the number thus established, shall be permitted in any such room.

Order 5717. Basement Rooms. Every basement living or sleeping room shall be at least 8 feet high from floor to ceiling. The ceiling shall be at least 4 feet above the outside grade. The walls and floor shall be dampproof and waterproof.

Order 5718. Windows. The outside windows in every sleeping or living room shall have a total area of at least one-tenth of the floor area of the room. The top of at least one such window shall be not less than 7 feet above the floor, and the upper half of it shall be made so as to open the full width.

See also orders 5203–5204.

SECTION 9. BOILER AND FURNACE ROOMS.

Order 5719. All boiler and furnace rooms, including breaching, and all laundries and drying rooms, in all buildings accommodating transients and in hospitals, asylums and other places of detention, shall be enclosed with standard fireproof enclosures and fireproof floor and ceiling.

See also orders 5212–5223.

SECTION 10. VENTILATION.

Order 5720. Pure air shall be provided at the rate of 1800 cubic feet per hour per person; provided the air in every public part of the building shall be changed at least twice each hour.

> **Note.** In rooms having sufficient window space, the above standard of ventilation can be secured if the windows are opened at top and bottom and a board is placed at the bottom to prevent drafts. This holds true in winter as well as in summer.

SECTION 11. TOILET ROOMS.

Order 5721. Every apartment shall have a water closet in a bathroom or separate compartment; except that where there are apartments consisting of but one or two rooms, there shall be at least one water closet for every two such apartments.

Every building shall have at least one water closet for every 15 rooms or fraction thereof.

See also orders 5205–5211.

> **Note.** Rooms with private water closets shall not be considered in counting either the number of rooms or the number of water closets.

SECTION 12. STANDPIPES AND FIRE EXTINGUISHERS.

Order 5722. For exterior standpipes see order 5135.

Standard interior standpipes (order 5136) shall be provided in every building which is more than two stories high and accommodates 20 or more transients, and in all hospitals, asylums and other places of detention. Not more than 75 feet of hose (order 5136) shall be attached to each standpipe at each floor level. The number and location of interior standpipes shall be such that the hose will reach at least two feet inside of each room.

In the above buildings where adequate water supply is not available, and in buildings accommodating less than 20 transients where interior standpipes are not provided, a standard fire extinguisher (order 5137) shall be placed on each floor at the head of each stairway and at each elevator or group of elevators.

SECTION 13. AUTOMATIC SPRINKLERS.

Order 5723. Where city water supply is available, an automatic sprinkler system (order 5138) shall be provided in the basement and sub-basements of all buildings of this classification, except apartment houses.

In addition to the sprinkler system, every room containing an ammonia machine or tank shall be provided with a 3-inch water pipe; the inner end of which shall be hung from the ceiling of the room and shall be perforated; and the outer end of which shall be located outside of the building with connection for the fire department, and shall also be connected with the city water supply.

> **Note.** The purpose of the latter provision is to permit flooding the ammonia room in case of a leak; the ammonia fumes would then be largely absorbed by the water.

SECTION 14. FIRE ALARM.

Order 5724. In every building accommodating 20 or more transients there shall be a proper alarm or gongs which can be operated from any story and can be heard throughout the building. Every such alarm system shall be tested at least once every week.

SECTION 15. DIRECTIONS FOR ESCAPE.

Order 5725. In every room liable to be used by transients a notice shall be conspicuously posted giving complete and plain directions for reaching at least two exits.

INDEX.

BY ORDER NUMBERS

Aisles (See Passageways and aisles).
Alterations covered by the code, 5001.
Apartment houses, hotels and places of detention, 5700–5725.
    Automatic sprinklers, 5723.
    Basement rooms, 5717.
    Boiler and furnace rooms, 5719.
    Classification, 5700–5701.
    Courts and shafts, 5709.
    Directions for escape, 5725.
    Elevators, (see general orders on Elevators, separate bulletin).
    Exits, 5710–5713.
    Fire alarms, 5724.
    Fire escapes, (see Exits).
    Height and class of construction and fire stops, 5702–5707.
    Lights, 5714.
    Passageways, 5713.
    Rooms and windows, 5716—5718.
    Scuttle, 5715.
    Stairways, (see Exits).
    Standpipes and fire extinguishers, 5722.
    Toilet rooms, 5721.
    Ventilation, 5720.
    Windows, 5718.
    Yards, 5708.
Asbestos curtain, 5524.
Assembly halls, (see Theaters and assembly halls).
Automatic sprinklers, 5138.
    Factories, office and mercantile buildings, 5412.
    Hotels, 5723.
    Theaters, 5539.

Basement defined, 5105.
Basement rooms:
    Apartment houses, hotels, etc., 5717.
    School buildings, 5613.
Boiler and furnace rooms, general requirements, 5212–5214.
    Apartment houses, hotels, etc., 5719.
    School buildings, libraries and museums, 5616.
    Theaters and assembly halls, 5531.
Boilers, furnaces and stoves, 5212–5214.
Brick walls, 5303–5312.
Buildings covered by the code, 5000–5005.
Buildings not covered by the code, 5006.
Buildings to be designed and supervised by competent persons, 5200.

Capacity of builings, notice to be posted, 5415.
Capacity of factories, office and mercantile buildings, 5405.
Capacity of schools, libraries and museums, 5606.
Capacity of theaters and assembly halls, 5506.
Cement, specifications for, 5313.
Chimneys, 5218–5223.
Club houses, (see Apartment houses, hotels, etc.).
Combustible partition and ceiling, 5114.
Concrete blocks, 5303, 5309.
Concrete construction, 5313–5315.
Concrete walls, 5315.
Court defined, 5107.
Courts, minimum size, etc., 5204.
    Apartment houses, hotels, etc., 5708–5709.
    School buildings, libraries and museums, 5603.
    Theaters and assembly halls, 5504.
Curtain walls, 5305.

Division walls, 5202.
Doors, (see Exits).

Electrical work, 5225. (See also under Lighting).
Elevators and elevator enclosures:
    Apartment houses, hotels, factories, office buildings, etc., (see general orders on elevators, separate bulletin).
    School buildings, libraries and museums, 5610.
    Theaters and assembly halls, 5522.
Exhibition buildings, (see Factories, office and mercantile buildings).
Existing buildings covered by the code, 5003—5005.
Exits, (including stairways, fire escapes and doors) general requirements, 5115–5133, (see also note on page 16).
    Apartment houses, hotels, etc., 5710–5713.
    Factories, office and mercantile buildings, 5401–5407.
    School buildings, libraries and museums, 5605–5608.
    Theaters and assembly halls, 5507–5515.
Exit lights, (see Lighting).

Factories, office and mercantile buildings, 5400–5415.
    Classification, 5400.
    Elevators and elevator enclosures, (see general orders on Elevators, separate bulletin).
    Exits, 5401–5407.
    Fire alarms, 5413.
    Fire escapes, (see Exits).
    Lighting, 5410.
    Notice of loads and persons accomodated, 5414–5415.
    Passageways, 5407.
    Scuttle, 5408.
    Stairways, (see Exits).
    Standpipes and fire extinguishers, 5411.
    Trap doors and floor openings, 5409.
Fire alarm:
    Apartment houses, hotels, etc., 5724.
    Factories, office and mercantile buildings, 5413.
    School buildings, libraries and museums, 5620.
    Theaters and assembly halls, 5541.
Fire door, 5110.
Fire escapes, specifications for, 5121–5131.
    Where required, (see Exits).
Fire extinguishers, 5137.
    Where required, (see Standpipes and fire extinguishers).
Fire ladders, 5134.
Fireproof construction defined, 5100.
Fireproof construction, where required:
    Apartmen thouses, hotels, etc., 5702, 5704.
    Assembly halls, 5503.
    Buildings over a certain height or area, 5201–5202.
    School buildings, libraries and museums, 5602.
    Theaters, 5502.
Fireproof curtain, 5524.
Fireproof enclosure, 5109.
Fireproof partition, 5109.
Fire stops in partitions, 5318.
Fire wall, 5108.
Fire window, 5111.
    Where required, 5108, 5109, 5112, 5201.
First floor defined, 5105.
Floor areas, maximum permitted, 5202.
Floor beams, and joists, bearing of, 5320.
Floor loads, 5300.
Floor loads, notices to be posted, 5414.
Floor openings in factories, etc., 5409.
Foundations, 5302.
Frame buildings defined, 5103.
Furnace rooms, (see Boiler and furnace rooms).
Furnaces, 5213–5214.
Furring for walls, 5319.

Gas lights, 5224.

Height of building, defined, 5104.
Height of building, maximum permitted, 5201.
Horizontal exit, 5120, (see also under Exits).
Hospitals, (see Apartment houses, hotels, etc.).
Hot air pipes and registers, 5217.
Hotels, (see Apartment houses, hotels, etc.).

Incombustible, defined, note to order 5100.
Incombustible roof covering defined, 5106.
    Where required, 5100–5102, 5201.

Jails, (see Apartment houses, hotels, etc.).

Lighting, general requirements, 5224–5225.
  Apartment houses, hotels, etc., 5714.
  Exit door lights, 5132.
  Factories, office and mercantile buildings, 5410.
  Theaters and assembly halls, 5533–5535.
Local regulations, 5007.
Lodging houses, (see Apartment houses, hotels, etc.).

Masonry construction, 5303–5312.
Mercantile buildings, (see Factories, office and mercantile buildings).
Mill construction defined, 5101.
Motion picture machines and booths, 5543–5551.

Office buildings, (see Factories, office and mercantile buildings).
Oil lights, 5224.
  Theaters, 5533.
Ordinary construction defined, 5102.

Passageways, aisles, etc.
  Apartment houses, hotels, etc., 5713.
  Factories, office and mercantile buildings, 5407.
  School buildings, libraries and museums, 5608, 5615.
  Theaters and assembly halls, 5517–5520.
Pile foundations, 5302.
Public halls, (see Theaters and assembly halls).

Roof loads, 5300.

School buildings, libraries and museums, 5600–5620.
  Assembly halls, 5614.
  Basement rooms, 5613.
  Boiler and furnace rooms, 5616.
  Classification, 5600.
  Elevators, 5610.
  Exits, 5605–5608.
  Exposure and courts, 5603.
  Fire alarm, 5620.
  Fire escapes, (see Exits).
  Height and class of construction, 5601–5602.
  Passageways, 5608.
  Rooms and windows, 5611–5613.
  Scuttle, 5609.
  Seats, desks and aisles, 5615.
  Stairways, (see Exits).
  Standpipes and fire extinguishers, 5619.
  Subdivisions and fire stops, 5604.
  Toilet rooms, 5618.
  Ventilation, 5617.
  Windows, 5612.
Scuttle:
  Apartment houses, hotels, etc., 5715.
  Factories, office and mercantile buildings, 5408.
  School buildings, libraries and museums, 5609.
  Theaters and assembly halls, 5521.
Seats:
  School buildings, libraries and museums, 5615.
  Theaters and assembly halls, 5516.
Semi-fireproof ceiling, 5113.
Semi-fireproof partition, 5112.
Smoke pipes, 5215.
Smokestacks, 5218–5223.
Sprinklers, automatic (see Automatic sprinklers).
Stacks, 5218–5223.
Stairways:
  Exterior enclosed, 5115.
  Interior enclosed, 5116.
  General requirements, 5117–5119.
  Number and size, (see Exits).
  Outside, 5131.
Standard exits, 5115–5133.
Standard fire doors, 5110.
Standard fire escape, specifications for, 5121–5131.
Standard fire extinguisher, 5137.
Standard fire ladder, 5134.
Standard fireproof enclosure, or partition, 5109.
Standard fire wall, 5108.
Standard fire window, 5111.
Standing room in theaters and assembly halls, 5506.
Standpipes and fire extinguishers, general requirements, 5135–5137.
  Apartment houses, hotels, etc., 5722.
  Factories, office and mercantile buildings, 5411.
  School buildings, libraries and museums, 5619.
  Theaters and assembly halls, 5537–5538.

Steam pipes, 5216.
Steel and iron construction, 5316.
Steel, reinforcing, 5313–5314.
Steel, structural, 5316.
Stone facing, 5307.
Stone walls, 5306.
Store buildings (see Factores, office and mercantile buildings).
Stoves, 5213–5214.
Street and alley defined, 5107.
Stresses in concrete, 5313.
Stresses in masonry, 5303.
Stresses in steel and iron, 5316.
Stresses in wood, 5317.
Structural design of buildings, 5300–5320.
Stud partitions, 5318.

Tenement house law, note on, preceding order 5700.
Tenement houses, (see Apartment houses).
Terra cotta facing, 5307.
Theaters and assembly halls, 5500–5551.
  Aisles and passageways, 5517–5520.
  Assembly halls in school buildings, 5614.
  Boiler and furnace rooms, 5531.
  Buildings used for other purposes, 5505.
  Capacity of, 5506.
  Classification, 5500–5501.
  Dressing rooms, 5530.
  Elevators, 5522.
  Emergency exits, 5512–5514.
  Exit doors, 5515.
  Exposure and courts, 5504.
  Fire escapes, (see Emergency exits).
  Fire protection, (standpipes, extinguishers, sprinklers, etc.), 5537–5541.
  Heating and ventilating, 5532.
  Height and class of construction, 5502–5503.
  Lights, 5533–5535.
  Mirrors and false openings, 5542.
  Motion picture machines and booths, 5543–5551.
  Proscenium wall and curtain, 5523–5524.
  Scuttle, 5521.
  Seats, 5516.
  Stairways, 5507–5514.
  Stage, 5525–5528.
  Toilet rooms, 5536.
  Workshops, storage and general property rooms, 5529.
Thickness of walls, 5304–5310; 5315. (See also Standard fire wall, 5108.)
Tile walls, 5303, 5309.
Timber construction, 5317–5320.
Toilet rooms, general requirements, 5205–5211.
  Apartment houses, hotels, etc., 5721.
  Places of employment (see general orders on Sanitation, separate bulletin).
  School buildings, libraries and museums, 5618.
  Theaters and assembly halls, 5536.
Trap doors and floor openings in factories, etc., 5409.

Urinals (see Toilet rooms).

Ventilation:
  Apartment houses, hotels, etc., 5720.
  Places of employment (see general orders on Sanitation, separate bulletin).
  School buildings, libraries and museums, 5617.
  Theaters and assembly halls, 5532.

Walls, thickness of, 5303–5310; 5315. (See also Standard fire wall, 5108.)
Warehouses, (see Factories, office and mercantile buildings).
Water closets, (see Toilet rooms).
Windows, general requirements, 5203–5204.
  Apartment houses, hotels, etc., 5718.
  School buildings, etc., 5612.
  (See also Courts and Ventilation.)
Wind pressure, buildings, 5301.
Wind pressure, chimneys, 5223.
Wired glass windows (see Fire windows).
Wood construction, 5317–5320.

Tog

BUILDING CODE

GIFT
APR 27 1923

LIBRARY
OF THE
UNIVERSITY
OF
CALIFORNIA

INDUSTRIAL COMMISSION
OF WISCONSIN
1921

Building Code

State of Wisconsin

Revised 1921

Issued by

Industrial Commission of Wisconsin

MADISON

STATE PUBLICATIONS COVERING LAWS RELATIVE TO BUILDINGS AND BUILDING WORK

Issued by Industrial Commission.

Building Code
Elevator Code
Industrial Lighting Code
General Orders on Existing Buildings
General Orders on Safety in Building Construction
General Orders on Fire Prevention
General Orders on Sanitation
General Orders on Safety
Boiler Code
Electrical Safety Code
Refrigerator Code

State Board of Health.

Plumbing Code
Code for Rural School Privies
Rules for Sanitary Care of Schools
Construction and Operation of Slaughterhouses
Public Comfort Station Code
Chemical and Dry Closet Code

Department of Public Instruction.

Rural School requirements for special State Aid

Any of the above bulletins will be furnished or sent on request.

Consult or Write Respective Departments as Follows:

1. Building Construction, Safety, Sanitation, etc., Industrial Commission.
2. Electrical Work, Industrial Lighting, etc., Industrial Commission.
3. Fire Prevention, Fire Protection, etc., Industrial Commission.
4. Heating, Ventilating, etc., Industrial Commission.
5. Plumbing, State Board of Health. (Plumbing Division.)
6. Water Supply, Sewage Disposal, etc., State Board of Health. (Plumbing Division.)

TABLE OF CONTENTS

By Pages

Page

Introduction 7

Part I. Scope of Building Code.

Section 1. New Buildings and Additions........ 11

Section 2. Alterations 11

Section 3. Change of Use........ 11

Section 4. Existing Buildings 11

Section 5. Buildings not Included........ 12

Section 6. Local Regulations 12

Section 7. Approval of Plans........ 12

Part II. Definitions and Standards.

Section 1. Fireproof Construction 14

Section 2. Mill Construction 17

Section 3. Ordinary Construction 17

Section 4. Frame Buildings 18

Section 5. Height of a Building........ 18

Section 6. Basement; First Floor; Number of Stories........ 18

Section 7. Incombustible Roof Covering........ 19

Section 8. Street, Alley, Court........ 19

Section 9. Standard Fire Stops........ 19

Section 10. Stairways 22

Section 11. Horizontal. Exits 26

Section 12. Fire Escapes 29

Section 13. Standard Exit Doors........ 35

Section 14. Location and Maintenance of Exits........ 36

Section 15. Standpipes, Fire Extinguishers, and Sprinklers.. 36

Part III. General Requirements. Page

Section 1. Design and Supervision of Buildings........ 39
Section 2. Height and Class of Construction........ 39
Section 3. Floor Areas........ 41
Section 4. Windows and Courts........ 42
Section 5. Boilers, Furnaces and Stoves........ 44
Section 6. Smoke Pipes........ 46
Section 7. Steam Pipes........ 47
Section 8. Air Pipes and Registers........ 48
Section 9. Chimneys........ 48
Section 10. Lights........ 51
Section 11. Electrical Work........ 51
Section 12. Special Hazards........ 52
Section 13. Toilet Rooms........ 53

Part IV. Structural Design.

Section 1. Floor and Roof Loads........ 62
Section 2. Wind Pressure........ 64
Section 3. Foundations........ 65
Section 4. Masonry Construction........ 65
Section 5. Concrete Construction........ 69
Section 6. Steel and Iron Construction........ 72
Section 7. Wood Construction........ 73

Part V. Factories, Office and Mercantile Buildings.

Section 1. Classification........ 75
Section 2. Exits........ 75
Section 3. Scuttle........ 79
Section 4. Trap Doors and Floor Openings........ 79
Section 5. Lighting........ 80
Section 6. Toilet Rooms, Lavatories and Dressing Rooms........ 80
Section 7. Standpipes, Fire Extinguishers and Sprinklers........ 82
Section 8. Fire Alarm........ 83
Section 9. Notice of Loads and Persons Accommodated........ 83

Part VI. Theaters and Assembly Halls. Page

Section 1. Classification 84

Section 2. Height and Class of Construction 85

Section 3. Exposure and Courts 87

Section 4. Buildings Used for Other Purposes 88

Section 5. Capacity 89

Section 6. Exits 89

Section 7. Seats 91

Section 8. Aisles and Passageways 91

Section 9. Elevators 92

Section 10. Stage 93

Section 11. Dressing Rooms, Property Rooms, Etc. 96

Section 12. Boiler and Furnace Rooms 96

Section 13. Heating and Ventilating 96

Section 14. Lights 97

Section 15. Toilet Rooms 98

Section 16. Fire Protection 99

Section 17. Mirrors: False Openings 100

Section 18. Motion Picture Machines and Booths 100

Part VII. School Buildings, Libraries and Museums.

Section 1. Classification 104

Section 2. Height and Class of Construction 104

Section 3. Exposure and Courts 105

Section 4. Exits 105

Section 5. Scuttle 107

Section 6. Rooms 108

Section 7. Assembly Halls 109

Section 8. Seats, Desks, and Aisles 109

Section 9. Boiler and Furnace Rooms 110

Section 10. Toilet Rooms 110

Section 11. Ventilation 111

Section 12. Lighting 111

Section 13. Standpipes and Fire Extinguishers 112

Section 14. Fire Alarms 112

Part VIII. Apartment Houses, Hotels and places of Detention. Page

Section 1. Classification 113
Section 2. Height and Class of Construction and Fire Stops 114
Section 3. Yards 115
Section 4. Courts and Shafts........ 116
Section 5. Exits 116
Section 6. Lights 118
Section 7. Scuttle 118
Section 8. Rooms and Windows........ 119
Section 9. Laundries, Boiler and Furnace Rooms........ 119
Section 10. Ventilation 120
Section 11. Toilet Rooms 120
Section 12. Water Supply 120
Section 13. Repairs 120
Section 14. Cleanliness 121
Section 15. Standpipes and Fire Extinguishers........ 121
Section 16. Fire Alarm 121
Section 17. Directions for Escape........ 121
Index 123

INDUSTRIAL COMMISSION OF WISCONSIN

FRED M. WILCOX, *Chairman* **THOMAS F. KONOP** **R. G. KNUTSON**

E. E. WITTE, *Secretary*
R. McA. KEOWN, *Engineer* W. C. MUEHLSTEIN, *Building Engineer*
E. W. CALLEN, J. H. BROWN, *Building Inspectors*

BUILDING CODE

INTRODUCTION.

This is a revision of the Wisconsin Building Code, which first became effective September 15, 1914. Additions and changes have been made at intervals since that date, the latest amendments having been adopted in August, 1921. This code has been adopted by the Industrial Commission in discharge of its duties under Sections 2394-41 to 2394-70, of the statutes of Wisconsin. It supplements the requirement of Section 2394-48, to the effect that "every employer and every owner of a place of employment and a public building now or hereafter constructed shall so construct, repair, or maintain such place of employment or public building, and every architect shall so prepare the plans for the construction of such place of employment or public building as to render the same safe."

Persons who violate the provisions of this code under Sections 2394-60 and 2394-70 become liable to a forfeiture of $10 to $100 for each day and each instance of violation. This code applies to all places of employment and to all public buildings. The latter term is defined in Section 2394-41 of the statutes to "mean and include any structure used in whole or in part as a place of resort, assemblage, lodging, trade, occupancy, or use by the public, or by three or more tenants."

It should be noted that the orders in this code are binding alike upon every owner of a place of employment or a public building, and upon architects who prepare plans for the construction of places of employment or public buildings. The term "owner", as here used, is defined in the statutes to include "every person, firm, corporation, state, county, town, city, village, manager, representative, officer, or other person having ownership, control, or custody of any place of employment or public building, or of the construction, repair, or maintenance of any public building, or who prepares plans for the construction of any place of employment or public building."

History of Building Code.

In the preparation of the Wisconsin Building Code, the Industrial Commission has had the advice and assistance of a Building Code Committee. This Committee, as originally constituted, was composed of the following named persons:

A. C. Eschweiler, architect, Milwaukee.
C. F. Ringer, former Inspector of Buildings, Milwaukee.
Howland Russel, architect, Milwaukee.
C. A. Halbert, civil engineer, Railroad Commission.
Sidney J. Williams, deputy, Industrial Commission.

In the preparation of the building code, this committee received the assistance of a large number of other persons, with wide practical experience in this field, including architects, builders, fire chiefs, city officials, and insurance men. All of the original members of the Building Code Committee have since 1914 resigned their membership. In their place other practical builders and architects have been appointed. The membership of the present Building Code Committee is given below.

Both the original code and amendments, subsequently adopted, were submitted to public hearings after having been drafted by the Building Code Committee. Notices of such hearings have, in each case, been sent by letter to a very large number of persons, and in addition they have been given widespread newspaper publicity. Many of these hearings have had a very large attendance and many valuable suggestions have resulted therefrom.

In this manner the commission has sought to make certain that its orders shall be both practical and reasonable. The provisions of the Wisconsin Building Code generally have the endorsement of responsible architects and builders. Many of the cities of the state have re-adopted the building code in total as a city ordinance with additional and stringent requirements, as deemed necessary to meet local conditions.

Administration

The building code will be enforced in cooperation with local officials, who are required by law to enforce all orders of the commission which are germane to their respective duties (Sec. 2394—70). With the state code as a foundation, city ordinances may go more into detail, if desired, or may contain more stringent requirements than those of the state code.

To secure the best results, plans should be filed with and approved by a city building inspector. This is now required in Milwaukee, Madison, Superior, Kenosha, Sheboygan, Eau Claire, Racine, Janesville, Beloit, Manitowoc. The Industrial Commission strongly recommends all cities to require building permits and thus prevent the construction of buildings which will endanger the lives of citizens and increase the possibility of disastrous general conflagration.

Appeal

Any person who considers any part of the building code, or any official's interpretation of the code, to be unreasonable, may appeal to the commission to interpret, modify, or suspend the same. (See Sections 2394—57 to 2394—59).

A building code committee, consisting of the architects and other experts listed below, acts as an advisory committee to the commission. Any person who is dissatisfied with any technical ruling of any inspector, may appeal to the building code committee, whose decision will be submitted to the commission for consideration.

Building Code Committee

Peter Brust, architect, Milwaukee.
Allan D. Conover, architect, Madison (Chairman).
John H. Findorff, general contractor, Madison.
J. E. Florin, Superintendent of Fire Prevention, Industrial Commission, Madison (Home address, Menomonie, Wis.)
Henry A. Foeller, architect, Green Bay.
Arthur A. Guilbert, architect, Racine.
Arthur Peabody, State architect, Madison.

Part I

SCOPE OF BUILDING CODE

SECTION 1. NEW BUILDINGS AND ADDITIONS.

Order 5000. This code shall apply to all new buildings and additions except those exempted in order 5006.

SECTION 2. ALTERATIONS.

Order 5001. This code shall apply to all alterations which affect the structural strength, fire hazard, exits, lighting or sanitary condition of any building except those exempted in order 5006. This does not include ordinary repairs necessary for the maintenance of any building.

SECTION 3. CHANGE OF USE.

Order 5002. This code shall apply as far as possible to all buildings which are to be devoted to a new use for which the requirements of this code are in any way more stringent than the requirements covering the previous use of the building.

SECTION 4. EXISTING BUILDINGS.

Order 5005. Every new installation, and every repair exceeding 50 per cent, of any

Roof covering
Toilet room
Boiler, furnace, or stove
Chimney or smoke pipe
Motion picture machine or booth

shall comply with the corresponding requirements of this code.

See also Orders 5001, 5002.

SECTION 5. BUILDINGS NOT INCLUDED.

Order 5006. This code does not apply to the following buildings:

(1) Private residences, and outbuildings in connection therewith, such as barns, private garages, etc.

Note. By private garage is meant any garage not included in definition of public garage in Order 5240.

(2) Flat buildings used as the residence of two families only, provided that not more than two persons are accommodated who are not members of the family.

(3) Buildings used for agricultural purposes which are not within the corporate limits of a city or village.

(4) Temporary buildings or sheds used for construction purposes only.

SECTION 6. LOCAL REGULATIONS.

Order 5007. This code shall not be understood to limit the power of cities, villages and towns to make or enforce additional or more stringent regulations provided the same do not conflict with this code, or with any other order of the Industrial Commission.

Note. Every municipality is recommended to adopt, for its own benefit:

(1) Definite fire limits, and regulations prohibiting the construction of frame buildings within such limits.

(2) Regulations governing the construction of private residences and other buildings not covered by this code.

(3) Other fire-preventive and sanitary regulations which cannot reasonably be included in a state code.

SECTION 7. APPROVAL OF PLANS.

Order 5008. Complete plans and specifications for all of the following buildings shall be submitted to the Industrial Commission for approval before letting contracts or commencing work:

Theaters and assembly halls:

Schools, colleges and academies;

Apartment houses, hotels and places of detention (see order 5701);

Factories, office and mercantile buildings, as follows:

(1) All buildings having floor or roof spans greater than 30 feet,

(2) All buildings which are more than two stories high,

(3) All buildings which are two stories high and are more than 5,000 square feet in area at the second floor level.

All plans shall be submitted in duplicate, except for private assembly halls, one or two-room schools, and factory, office and mercantile buildings, and these latter may be submitted in duplicate if desired.

Note. Only those plans which are submitted in duplicate will receive the stamped approval of the Industrial Commission.

The location of adjoining streets, alleys, and lot lines, and of other buildings in the same lot (if any) shall be shown on the plans. All plans and specifications shall be signed by the architect, engineer or other chief designer.

This requirement shall apply to additions and enlargements, as well as to new buildings, and shall also apply to all cases where any of the above occupancies are to be located in a building previously used for other purposes.

This requirement shall not apply in cities where plans are examined and building permits are issued by a city building inspector, in a manner approved by the Industrial Commission.

After being approved by the Industrial Commission, plans and specifications shall not be changed in any respect which affects the safety of the occupants, or which is covered by this code, except with the written consent of the Industrial Commission.

Note. The Industrial Commission will be glad to examine and approve plans for other buildings covered by the code, such as small factories, offices and mercantile buildings which are not included above. All such buildings must, of course, comply with the code, whether plans are submitted or not.

Order 5009. If plans for any building are approved by the Industrial Commission, or by the city building inspector, plumbing inspector, or health department, the architect or builder shall keep at the building either the plans which were approved, or a copy thereof, and shall mark on such plans, in ink, the person or department which gave the approval, and the date thereof.

Note. The purpose of this order is to make it possible for any building or plumbing inspector, whether state or city, to ascertain when he visits a building under construction, whether the plans have been approved and by what department, in case he finds any apparent violation. The architect can easily comply with this requirement as follows: When a plan has been approved, mark on the tracing and on blueprints previously made, "This plan was approved by ——— on ———."

Part II

DEFINITIONS AND STANDARDS

Note. The definitions of orders 5100, 5101, 5102 apply to buildings which are required to be of fireproof, mill or ordinary construction, respectively. See orders 5201-5202, 5502-5503, 5602, 5702-5703.

SECTION 1. FIREPROOF CONSTRUCTION.

Order 5100. A building is of fireproof construction if all the walls, partitions, piers, columns, floors, ceilings, roof and stairs are built of incombustible material; and if all metallic structural members are protected by an incombustible fire resisting covering of low heat conductivity, of not less than 2 inches thickness of concrete, or 3 inches thickness of other approved material, for columns; not less than 2 inches thickness for girders; and not less than 1½ inches thickness for other structural parts. This thickness shall be outside of the extreme edges of structural members. Such covering shall consist of Portland cement concrete, brick, terra cotta, or tile, laid in cement mortar, or other approved material and shall be properly reinforced, bonded, wired or otherwise secured in place. Steel reinforcement shall be protected as in order 5313. The plastering shall not be applied to wood lath or wood furring strips.

Floor panels may be built of approved metal (see Order 5316), designed to resist all stresses independent of any protective covering, protected on the upper and lower sides. Steel lumber joists shall not be spaced more than 24 inches center to center well bridged with proper tension strips. Upper slab shall be reinforced concrete not less than 2 inches thick over all structural metal. Expanded metal or metal lath of proper weight and rigidity to span the joist spacing, well fastened to joists, may be used for reinforcement, but no metal less than 24 gauge shall be used. Lower side of joists shall be protected by not less than ⅞ inch cement plaster on expanded metal or metal lath. The upper slab and plastered ceiling shall create air spaces between the metal floor supports completely isolated from the open atmosphere. All beams and girders supporting the floor panels shall be fully protected. Connections of metal joists to beams, girders, and other bearings shall be in a manner approved by the Industrial Commission. All steel lumber joists shall receive a protective coat of lead and oil or bituminous paint before being placed in position. Metal lumber shall not be used in floor panels having less than 3 feet of well ventilated air space below or in floor panels over damp basements.

Note. Expanded metal or metal lath weighing not less than 3¾ lbs. per square yard should be considered the minimum for joist spacing of 23½ inches, and 2¾ lbs. per square yard for joists spacing of 15¾ inches.

The trimmings and finished floor may be of wood, provided all spaces behind or below same are filled with incombustible material. Partitions entirely contained within a private apartment may be non-fireproof provided the partitions enclosing such apartment are fireproof.

A wood roof with incombustible roof covering will be permitted on a fireproof building not more than 85 feet high, provided the ceiling of the uppermost story is of fireproof construction not suspended from the roof.

A room or a portion of a building is of fireproof construction if it complies with all of the above requirements, and is separated from the rest of the building by means of fireproof walls, floors and ceiling, in which all openings are protected by means of fire doors or fixed standard fire windows.

For outside windows and doors see order 5201.

Note (a). A "fireproof" floor, ceiling, or wall is one of "fireproof construction." A "standard fire wall," "fireproof partition," etc., are defined in orders 5108-5113. "Incombustible" includes any material which will not burn or support combustion.

Note (b). To secure the best protection against a severe fire, the finish, floors, trim, doors, windows, etc., should be made entirely of incombustible material.

The fireproof covering of exterior columns should be at least 4 inches thick to resist a severe fire.

Note (c). The fireproofing of steel roof trusses may, if approved by the Industrial Commission, be omitted in cases where no increased hazard will result.

Order 5100-A. Protected Construction—Steel Lumber Floor Panels. Floor panels will be considered of protected construction if built of approved metal (see Order 5316) designed to resist all stresses independent of any protective covering, and protected on the upper and lower sides. Steel lumber joists shall not be spaced more than 24 inches center to center, well bridged with proper tension strips. Upper slab shall be reinforced concrete not less than 2 inches thick over all structural metal. Expanded metal or metal lath of proper weight and rigidity to span the joist spacing, well fastened to joists, may be used for reinforcement, but no metal less than 24 gauge shall be used. Lower side of joists and structural supports shall be protected by not less than ⅞ inch cement plaster on expanded metal or metal lath. The upper slab and plastered ceiling shall create air spaces between the metal floor supports completely isolated from the open atmosphere.

Connections of metal joists to beams, girders and other bearings shall be in a manner approved by the Industrial Commission.

All columns supporting floor panels of protected construction shall be protected as in Order 5100. The lower flanges of structural members other than metal joists shall be kept away 1 inch from ceiling plaster with metal furring. The metal of beams, girders and joists between the upper slab and plastered ceiling of floor construction need not be covered.

All steel lumber floor joists shall receive a protective coat of oil and lead or bituminous paint before being placed in position.

Metal lumber shall not be used in floor panels having less than three feet of well ventilated air space below or in floor panels over damp basements.

Order 5100-B. Protected Construction—Steel Lumber Partitions. Partitions will be considered of protected construction if built of approved metal (see Order 5316) designed to resist all stresses independent of any protective covering, and protected on both sides with metal lath and not less than ¾ inch of cement or gypsum plaster. The covering of metal lath and plaster shall create air spaces between the metal completely isolated from the open atmosphere.

Where steel lumber is used in bearing partitions approved connection must be made with proper top and bottom bearings.

All steel lumber shall receive a protective coat of oil and lead or bituminous paint before being placed in position.

SECTION 2. MILL CONSTRUCTION.

Order 5101. A building is of mill construction if all walls are built of incombustible material, and if all wood girders and joists are at least 5½ inches thick. No wood girder or joist shall measure less than 63 square inches and no wood posts less than 90 square inches in sectional area, except that 7½ x 7½ inch (or larger) posts may be used in the top story only. All structural steel or iron (not including post caps, bases, and joists hangers) shall be fireproofed with not less than one inch of incombustible material or with metal lath and cement or gypsum plaster. The lower thickness of each floor shall be not less than 2⅝ inch lumber with grooves and splines at the joints; this shall be covered with felt or building paper, and with a separate finished floor not less than 13-16 inch thick.

Note. Floor joists should be at least 7½ inches thick. The roof shall be at least 2½ inches thick and shall have an incombustible roof covering; if an airtight roof covering (such as felt or tin) is not used, then the roof planking shall be in two thicknesses, with felt or building paper between.

There shall be no openings in the floor unless protected by standard fire doors, and no concealed air spaces except such as are enclosed by incombustible material.

All stairways and elevators shall be enclosed with standard fireproof enclosures.

For outside windows and doors see order 5201.

SECTION 3. ORDINARY CONSTRUCTION.

Order 5102. A building is of ordinary construction if all enclosing walls consist of incombustible material, and the roof has an incombustible covering, but other requirements for fireproof or mill construction are not complied with. No joist, rafter, or stud shall be less than 1⅝ inches thick. In buildings of more than one story, floor and roof joists shall not be supported by combustible stud partitions, but shall be supported by incombustible walls or partitions, or by semi-fireproof partitions (order 5112) or by columns and girders. If a bearing partition is supported by a steel girder, the portion of such girder which projects below the ceiling shall be covered with metal lath and plaster or other approved fireproofing.

For outside windows and doors see order 5201.

SECTION 4. FRAME BUILDING.

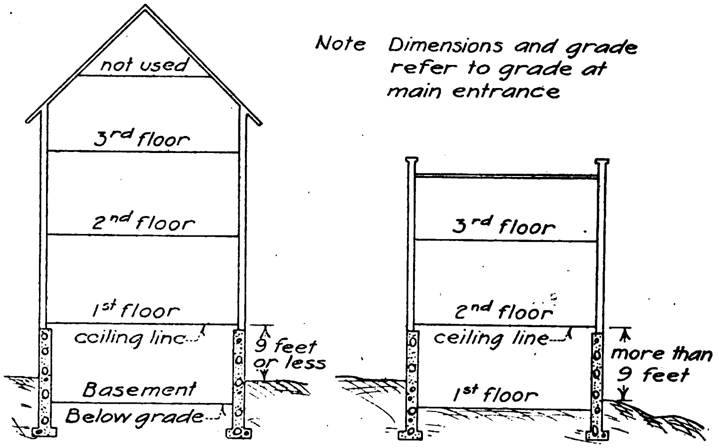
Order 5103. A frame building is a building whose structural parts and enclosing walls consist of wood. If such enclosing walls are veneered, encased or faced with stone, brick, tile, concrete, plaster or metal whose stability or rigidity depends upon the frame wall, the building is also termed a frame building.

SECTION 5. HEIGHT OF BUILDING.

Order 5104. The height of a building is measured at the center line of its principal front, from the street grade (or, if setting back from the street, from the grade of the ground adjoining the building) to the highest part of the roof, if a flat roof, or to a point 2-3 the height of the roof, if a gabled or hipped roof. If the grade of the lot or adjoining street in the rear or alongside of the building falls below the grade at the front, the height shall be measured at the center of the lowest side.

SECTION 6. BASEMENT: FIRST FLOOR: NUMBER OF STORIES.

Order 5105. A basement is a story whose floorline is below



THREE STORY BUILDINGS

the grade at the main entrance and whose ceiling is not more than 9 feet above such grade. The first floor is the floor next above the basement, or the lowest floor if there is no basement. The number of stories of a building includes all stories except the basement.

SECTION 7. INCOMBUSTIBLE ROOF COVERING.

Order 5106. A roof covering is considered incombustible if made of three thicknesses of roofing felt with tar and gravel, or if made of tin, corrugated iron, galvanized iron, or other approved fire resisting material.

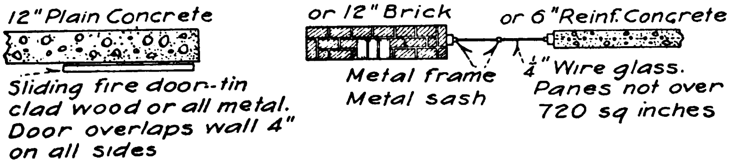
SECTION 8. STREET, ALLEY, COURT.

Order 5107. A street is any public thoroughfare 30 feet or more in width. An alley is any public thoroughfare less than 30 feet but not less than 10 feet in width. Any space less than 10 feet wide is a court.

For required size of court see order 5205.

SECTION 9. STANDARD FIRE STOPS.

Order 5108. Standard Fire Wall. A standard fire wall shall be built of brick or concrete not less than 12 inches in solid thickness, or of reinforced concrete not less than 6 inches thick. Every standard fire wall shall extend either from the foundation or from a fireproof floor, to a fireproof ceiling; or if the roof is not fireproof, such wall shall extend at least 3 feet above the highest adjoining roof line of the same building and shall be capped with stone, tile, or other indestructible material. Every opening in a standard fire wall shall be closed with a standard fire door or a fixed standard fire window.

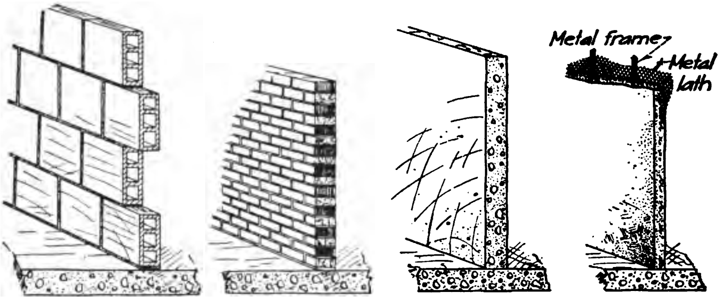

12" Plain Concrete
or 12" Brick
or 6" Reinf. Concrete
Sliding fire door-tin clad wood or all metal. Door overlaps wall 4" on all sides
Metal frame
Metal sash
¼" Wire glass. Panes not over 720 sq inches

STANDARD FIRE WALLS

Note. Windows in a fire wall should be avoided if possible, because even a wire glass window permits an intense radiation of heat and may melt in a hot fire. Windows are not permitted in a division wall (order 5202).

Order 5109. Standard Fireproof Enclosure or Partition. A standard fireproof enclosure or partition shall be made either of wired glass in metal frame, or of solid plaster not less than 2 inches thick on metal lath and metal frame (all metal of lath and frame to be well covered), or of brick, concrete or tile of sufficient thickness to give rigidity. A standard fireproof enclosure or partition must rest on a masonry foundation or a fireproof floor, and must extend to a fireproof or semi-fireproof roof or ceiling. The wired glass in a fireproof enclosure or partition shall conform to the requirements for standard fire windows and the doors shall be standard fire doors; except that the doors may contain wired glass as specified for standard fire windows.

Note. A wired glass enclosure does not offer as high a degree of protection as the other types mentioned, because of the radiation of heat through the glass, and the tendency of the exposed metal frame to buckle when heated.



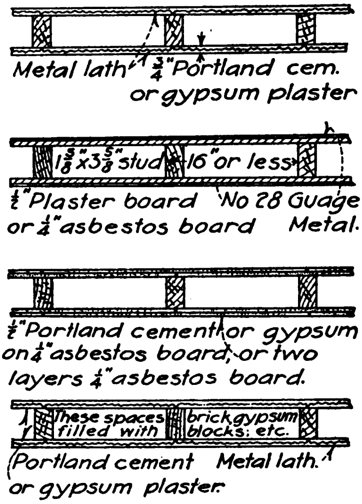
Hollow tile Brick Concrete 2" Solid plaster

FIRE PROOF ENCLOSURES

Order 5110. Standard Fire Door. A standard fire door shall consist of a wooden core encased with tin, or shall be entirely of metal; and shall be of design approved by the Industrial Commission. The door frame shall be metal. The door shall close automatically in case of fire.

Order 5111. Standard Fire Window. A standard fire window shall have a metal frame, metal sash, and wired glass of design approved by the Industrial Commission. No pane shall be less than ¼ inch thick nor of greater area than 720 square inches. The window either shall be fixed or shall close automatically in case of fire.

Order 5112. Semi-Fireproof Partition. A semi-fireproof partition shall be constructed of not less than 1⅝ x 3⅝ inch studding, spaced not more than 16 inches center to center, with the 3⅝ inch dimension at right angles with the plane of the wall, and having the following protection on both sides of the partition:


Metal lath
¾" Portland cem. or gypsum plaster
1⅝"x3⅝" stud
16" or less
½" Plaster board or ¼" asbestos board
No 28 Guage Metal.
½" Portland cement or gypsum on ¼" asbestos board, or two layers ¼" asbestos board.
These spaces filled with brick, gypsum blocks; etc.
Portland cement or gypsum plaster.
Metal lath.

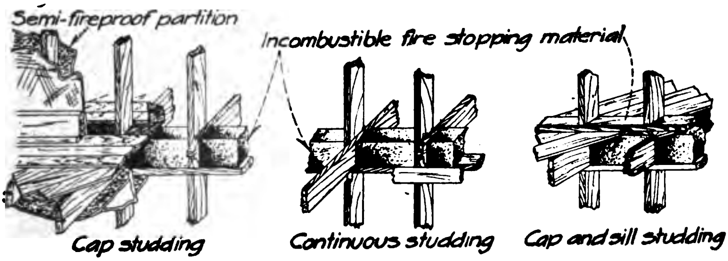
SEMI-FIREPROOF PARTITIONS

(1) Metal lath and at least ¾ inch of Portland cement gypsum plaster, or gauged plaster containing one-half part lime, one-half part (or more) Portland cement, and not over four parts sand; or

(2) good quality plaster board at least ½ inch thick, covered with sheet metal; or

(3) ¼ inch asbestos board, covered with at least ½ inch Portland cement or gypsum plaster, or with sheet metal; or two layers of ¼ inch asbestos board, breaking joints; or

(4) the spaces between studding may be filled with approved incombustible material, the partition being plastered with Portland cement or gypsum plaster on metal lath; or



Cap studding Continuous studding Cap and sill studding

FIRE STOPPING

(5) other equivalent approved fire resisting construction. Below every hollow semi-fireproof partition, whether bearing or non-bearing, the spaces between floor joists shall be

fire stopped with incombustible material extending the full height of the joists and the full thickness of the partition.

Every doorway in a semi-fireproof partition shall be protected with a standard fire door or with a self-closing wooden door at least ⅞ inch thick in its thinnest part. The glass in such partitions and doors shall be wire glass.

Note. A fire door is of course much better than an unprotected wooden door. Many types of ornamental fire doors are now on the market. Wooden doors if used should preferably be at least 1⅛ inches thick.

Order 5113. Semi-Fireproof Ceiling. A semi-fireproof ceiling shall be constructed of not less than 1⅝ inch joists, spaced not more than 16 inches center to center, protected on the under side the same as specified for a semi-fireproof partition (order 5112); but gypsum plaster shall not be used for basement ceilings. The spaces between the joists shall be fire stopped, at intervals not greater than 25 feet, with incombustible material extending the full height of the joists.

Order 5114. Combustible Partitions or Ceiling. Every partition, ceiling or wall which is not fireproof or semi-fireproof is considered combustible.

SECTION 10. STAIRWAYS.

Note. Sections 10, 11, and 12 contain specifications for various types of exits (means of ingress and egress).

Exits may be classified as follows:

(1) Stair Exits:
    Exterior enclosed stairway, or smoke proof tower.
    Interior enclosed stairway.
(2) Horizontal Exits.

The foregoing types of exits are now generally agreed to be the most efficient. Enclosed stair shafts, and fireproof dividing partitions, prevent the spread of fire and protect both life and property. The exterior enclosed stairway, or smoke proof tower, is the safest possible form of stair exit and also furnishes a protected position from which firemen can attack a fire on any floor.

The following types of exits have a limited value and are permitted under certain conditions:

(3) Open or unenclosed stairways:
    Interior.
    Exterior.

(4) Fire escapes:
"A" fire escapes.
"B" fire escapes.

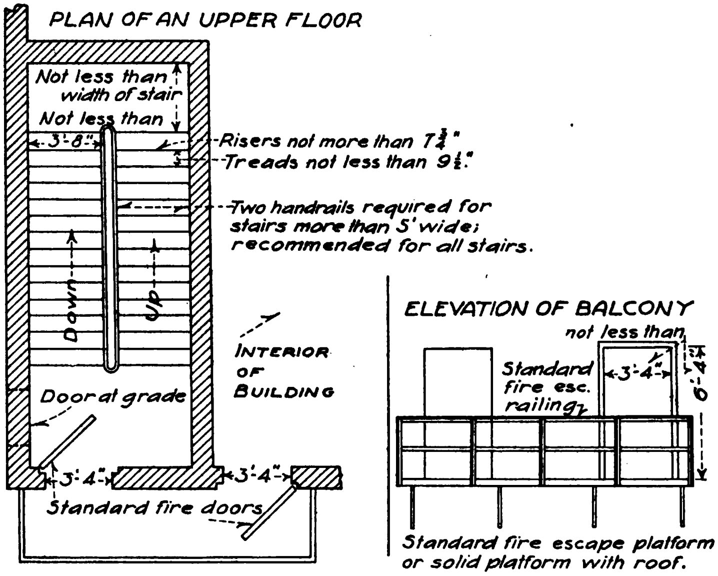
Unenclosed stairways and outside fire escapes are not reliable for the protection of life, except in low buildings, and are no protection for property.

To secure the best possible fire protection in a building accommodating a considerable number of persons, the building should be divided by a fireproof wall or partition, the two sections being connected by horizontal exits through or around the dividing wall, and each section being provided with one or more enclosed stairways; one stairway should be an exterior enclosed stairway, if possible. In case of fire in one section of such a building, the occupants can escape by the horizontal exits to the other section, and thence leave the building by means of the stairways without panic. The same protection can be secured in the case of two adjoining buildings, by connecting the two buildings with horizontal exits, each building being provided with one or more enclosed stairways. Where only a moderate number of persons are accommodated, the dividing partition is not so essential, but the stairways should be enclosed.

Fire drills are of great value in lessening the danger of panic and loss of life.

For the number, size, type, and location of exits in buildings of various classes, see the orders on exits in Parts V to VIII (orders 5401—5, 5507—12, 5606—7, 5710—12).

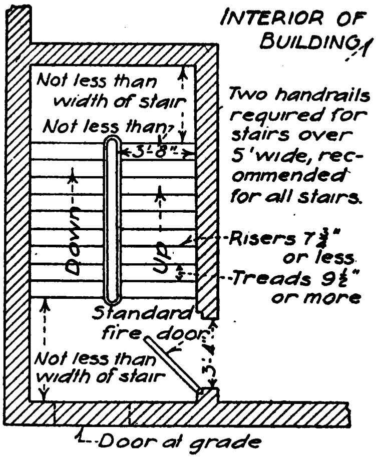
Order 5115. Exterior Enclosed Stairway. (Smoke proof Tower). An exterior enclosed stairway shall be an enclosed stairway which is entirely cut off from the building and which is reached by means of open balconies or platforms. The entire stair enclosure, stairway balconies and balcony railings shall be made of incombustible material throughout. The wall separating the stairway from the building shall not be pierced by any door, window, or other opening. In a fireproof building this wall shall be built as prescribed for a standard fireproof enclosure (order 5109) but without glass; in a non-fireproof building, this wall shall be built as prescribed for an outside wall (orders 5304—5311). The doors leading from the buildings to the balconies and from the balconies to the stairway shall be standard fire doors, and all openings within 10 feet of any balcony shall be protected with standard fire windows or standard fire doors. Each balcony shall be covered at the top and shall be open on at least one side, with a railing on all open sides not less than 3 feet high. See orders 5117—5119.



EXTERIOR ENCLOSED STAIR

Order 5116. Interior Enclosed Stairway. An interior enclosed stairway shall be completely enclosed with a standard fireproof enclosure (order 5109); except that in buildings of not more than three stories, such stairways may be enclosed with semi-fireproof partitions (order 5112). In theaters and assembly halls, the door at the top of the stairway may be omitted.

The enclosure shall include at each floor level a portion of such floor which shall be at least as wide as the stairway; and such enclosure shall also include the passageway (if any) leading from the stairway to an outside door; so as to afford uninterrupted passage from the uppermost floor to such outside door, without leaving the enclosure. If windows are placed in such enclosure (excepting in the outside wall), such windows shall be fixed.


INTERIOR OF BUILDING
Not less than width of stair
Not less than 3'-8"
Two handrails required for stairs over 5' wide, recommended for all stairs.
Down
Up
Risers 7¾" or less
Treads 9½" or more
Standard fire door
3'-4"
Not less than width of stair
Door at grade

INTERIOR ENCLOSED STAIR

Note. Such windows permit an intense radiation of heat and should be avoided if possible. Where unavoidable, they should be placed at least six fet above the stairs or platforms.

See also the following orders.

Order 5117. All Stair Exits: Width. Every required stairway, whether enclosed or not, shall be at least 3 feet 8 inches wide, of which not more than 4 inches on each side may be occupied by a handrail. Every platform shall be at least as wide as the stairway, measuring at right angles to the direction of travel. Every straight-run platform shall measure at least 3 feet in the direction of travel. Wherever a door opens onto a stairway, a platform shall be provided extending the full width of the door.

The width of any stairway shall be the clear distance between walls or stringers, of which not more than 4 inches on each side may be occupied by a handrail.

Note. If other stairways are provided in addition to those required by this code, such additional stairways need not conform to this order.

Order 5118. All Stair Exits: Handrails. All stairways and steps of more than three risers shall have at least one handrail. Stairways and steps 5 feet or more in width, or open on both sides, shall have a handrail on each side. Stairways which are required to be more than 8 feet wide shall be divided by center rails into widths not more than 8 feet nor less than 3 feet 8 inches. Center rails shall have upper newel post at least 5 feet 6 inches high, or rail may be turned down to the floor in a manner to prevent hindrance. Rails shall be not less than 2 feet 6 inches vertically above nose of treads or 3 feet above platform.

For theaters and assembly halls, see also order 5509.

Note. In railroad stations, etc., where large crowds are handled, good results have been obtained by providing intermediate handrails from 26 to 34 inches apart.

Order 5119. All Stair Exits: Risers and Treads. All stairways and steps used by the public or by more than 20 persons, shall have a uniform rise of not more than 7¾ inches and a uniform tread of not less than 9½ inches, measuring from tread to tread, and from riser to riser; no winders shall be used; there shall not be more than 18 risers between platforms or between floor and platform or not more than 22 risers from floor to floor with no platform; in stairs used by the public (theaters, public assembly halls, retail stores, schools, hotels, and similar buildings) there shall not be less than 3 risers between platforms or between floor and platform. Stairways or steps not used by the public or by more than 20 persons, shall have a uniform rise of not more than 8 inches and a uniform tread of not less than 9 inches; if winders are used, the tread shall be at least 7 inches wide at a point one foot from the narrow end.

The edges of all treads, and the edges of stairway landings must be finished with a non-slippery surface.

For theaters and public assembly halls, see also order 5509.

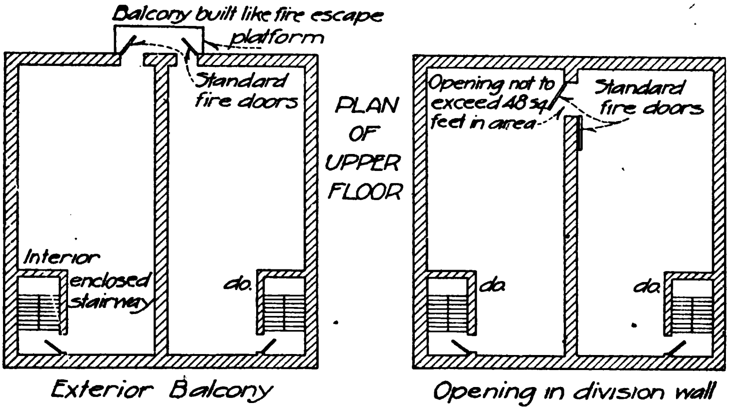
SECTION 11. HORIZONTAL EXITS.

Order 5120. A horizontal exit shall be either

(1) An opening through a fireproof wall or partition (order 5109) which separates two buildings or two divisions of a building; every such opening shall be protected by a standard fire door on each side of the wall, and the door on one side shall be self-closing; the opening shall not exceed 48 square feet in area; or

(2) an exterior balcony or bridge which connects two build-

ings or two divisions of a building. Every such balcony or bridge, including its railings, its supporting brackets or beams, and the exits thereto, shall be constructed the same as specified for fire escapes, (orders 5122—5125, 5128). The floor shall not have a slope of more than one foot in five. All doors and windows which open onto the balcony or bridge, or which are within 10 feet of the same, shall be standard fire doors or standard fire windows; but if such doors and windows are in walls which are in the same plane, then this requirement shall apply only to those doors and windows which are within 5 feet of the dividing wall.

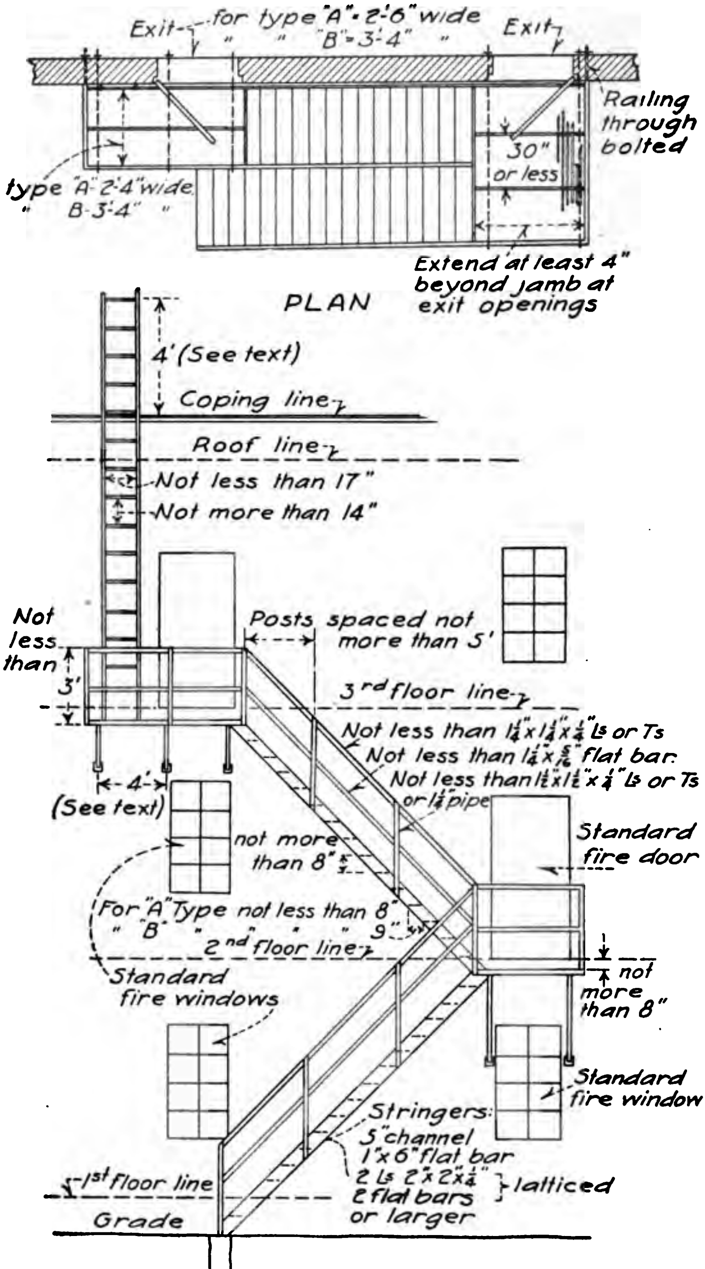

Balcony built like fire escape platform
Standard fire doors
Interior enclosed stairway
do.
PLAN OF UPPER FLOOR
Opening not to exceed 48 sq. feet in area
Standard fire doors
do.
do.
Exterior Balcony
Opening in division wall

HORIZONTAL EXITS

If a horizontal exit takes the place of an "A" standard fire escape, it shall be at least 2 feet 4 inches wide; if it takes the place of a "B" standard fire escape, it shall be at least 3 feet 4 inches wide.

The floor on each side of a horizontal exit shall contain at least 3 square feet of unobstructed floor space per person, for all persons accommodated on both sides of such exit; and shall contain at least one stairway.

See also order 5132.



ELEVATION

FIRE ESCAPES

SECTION 12. FIRE ESCAPES.

Note. For the number, size, and location of fire escapes on new buildings of various classes, see the orders on exits in Parts V to VIII (orders 5401—5, 5507—12, 5606—7, 5710—12).

For fire escapes on existing buildings, see the General Orders on Existing Buildings.

The following orders define two sizes of fire escapes, called "A" and "B". Where not otherwise stated, the orders apply to both sizes.

Order 5121. Location. Every fire escape shall be so located as to lead directly to a street, alley, or open court connected with a street.

Every fire escape shall be placed against a blank wall if possible. If such a location is not possible, then every wall opening which is less than 6 feet distant from any riser of the fire escape shall be protected by a standard fire door or standard fire window, except in the top story, and excepting two story buildings other than theaters and assembly halls.

Order 5122. Exits to fire escapes. Every fire escape shall be accessible from a public passageway or shall be directly accessible from each occupied room. Exits to fire escapes shall be standard exit doors (order 5132) except that doors to "A" fire escapes may be not less than 2 feet 6 inches wide.

Order 5123. Material and Strength. No other material than wrought iron or soft or medium steel shall be used for any part of a fire escape, except for weights, separators, and ornaments. No bar material less than ¼-inch thick shall be used in the construction of any fire escape, except for separators, ornaments, structural shapes over 3 inches and rigidly built up treads and platforms of approved design. All bolts and rivets, except for ornamental work, shall be not less than ⅜-inch in diameter.

Each part of every fire escape (except counterweights for balanced stairways) shall be designed and constructed to carry a live load of 100 pounds per square foot of horizontal area over the entire fire escape. Each part of every fire escape shall be designed and constructed in accordance with the requirements on Structural Design (order 5316) except that the unit stresses therein specified shall be reduced by one-fourth. The minimum sections and sizes specified below, shall be increased whenever necessary so that under full load the allowable unit stresses will not be exceeded.

Order 5124. Platforms. Each platform of an "A" fire escape shall be at least 28 inches wide; each platform of a "B" fire escape shall be at least 3 feet 4 inches wide. Such widths shall be the clear distance between stringers, measuring at the narrowest point. Each platform shall extend at least 4 inches beyond the jambs of exit openings. The above minimum widths and lengths shall be increased, wherever necessary, so that no exit door or window will, when open, block any part of the required width of the fire escape.

Every platform shall consist of either

(1) Flat bars on edge, not less than 1 x ¼ inch; but not less than 1¼ x ¼ inch where bolts and separators are used; bars shall not be more than 1¼ inches center to center.

(2) ½ inch or ⅝ inch square bars with sharp edge up, not more than 1½ inches center to center.

(3) ⅝ inch round bars, not more than 1½ inches center to center.

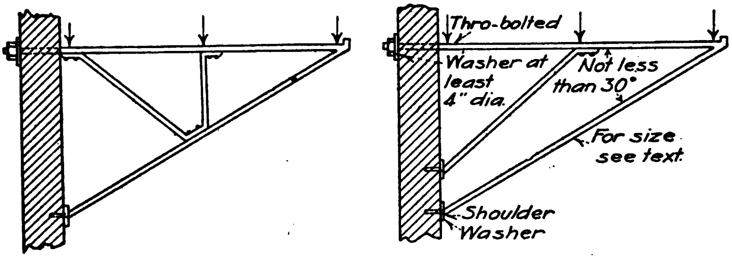
Platform and treads may be solid if covered by a roof.

The platform frame shall consist of not less than 2 x ⅜ inch flat bars on edge or equivalent, provided the brackets are not more than 4 feet apart. If brackets are more than 4 feet apart, the frame shall be correspondingly stronger and stiffer. Every platform wider than 30 inches, if made of square or round bars, shall have a third frame bar through the center; if made of flat bars, the platform shall have separators and bolts through the center. Frame bars shall not project more than ¼ inch above platform bars, except around the outside of platform.

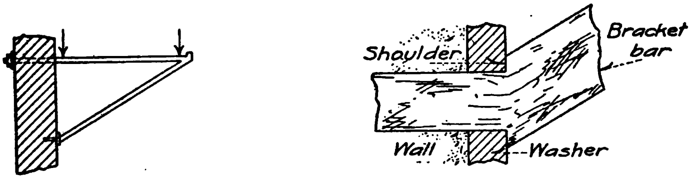
There shall be a platform at each story above the first, and intermediate platforms if floors are more than 18 feet apart vertically.

Platforms shall not be more than 8 inches below the door sill.

Order 5125. Brackets. Brackets for a 28 inch or 30 inch platform, when spaced not more than 4 feet apart, shall be made of not less than ⅞ inch square bars or 1½ x 1½ x ¼ inch angles; such bars or angles shall be larger if the platform is wider or if the brackets are farther apart. Each bracket shall be fastened at the top, to the wall, by a through bolt (at least ⅞ inch diameter), nut, and washer (at least 4 inch diameter). The slope of the lower bracket bar shall be not less than 30 degrees with the horizontal. The lower bar shall have a washer or shoulder to give sufficient bearing against the wall.



TWO TYPES OF TWO STAIR SUPPORT



ONE STAIR SUPPORT DETAIL OF WALL BEARING

TYPICAL FIRE ESCAPE BRACKETS

Note. In applying the requirements for Structural Design (order 5316) to the design of a bracket the lower bracket bar must be designed according to the column formula. According to this formula (for example), brackets made of 1 inch square wrought iron, 4 feet apart, carrying a 3 feet 4 inch platform, are just within the limit of stiffness. If the brackets were over 4 feet apart, a heavier bar or an angle would have to be used.

The strength of the wall to which brackets are to be attached shall be carefully considered in determining the spacing, shape, and inside connection of brackets, so that under full load the wall will not be unduly strained.

Order 5126. Stairways. Each stairway of an "A" fire escape shall be at least 24 inches wide between stringers; such stairway shall have a uniform rise of not more than 8 inches, and a uniform run of not less than 8 inches.

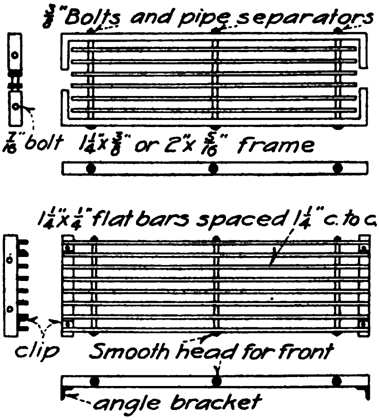
Each stairway of a "B" fire escape shall be at least 3 feet 4 inches wide between stringers; such stairway shall have a uniform rise of not more than 8 inches, and a uniform run of not less than 9 inches.

Note. The rise is the vertical distance from the extreme edge of any step to the corresponding extreme edge of the next step. The run is the horizontal distance between the same points.

Stairway stringers shall consist of either.

(1) A 5 inch channel or larger.
(2) Two angles 2 x 2 x ¼ inch or larger.
(3) Two flat bars 2 x ⅜ inch or larger.
(4) One flat bar 6 x ¼ inch of larger.

If two angles or two flat bars are used, they shall be properly tied together by lattice bars, vertical as well as horizontal. If flat bars are used, every stairway of more than 10 risers shall have lateral bracing. The connection of stringers to platform, at top and bottom, shall be at least equal in strength to the stringers and shall safely carry the full live and dead loads. If stringers are carried by intermediate brackets, the stringers shall have a horizontal bearing on the brackets and shall be properly and securely connected thereto.


⅜" Bolts and pipe separators
$\frac{7}{16}$" bolt
1¼" x ⅜" or 2" x $\frac{5}{16}$" frame
1¼" x ¼" flat bars spaced 1¼" c. to c.
clip
Smooth head for front
angle bracket

"B" Type Fire Escape
TYPICAL TREADS

Treads shall consist of either flat or square bars, (not round), of the size and spacing specified for platforms. An "A" tread shall consist of at least six square bars, or seven flat bars. A "B" tread shall consist of at least seven square bars, or eight flat bars. A "B" tread made of flat bars shall have separators and bolt through the center. A "B" tread made of square bars shall be trussed.

Treads and platforms may be solid if covered by a roof.

Order 5127. Balanced Stairway. All "B" fire escapes, and all fire escapes on schools, theaters, and assembly halls, either shall reach to the ground or shall have a balanced stairway reaching to the ground. "A" fire escapes which are not on schools, theaters, or assembly halls, may terminate in a platform at least 3 feet long, located not more than 10 feet above the ground.

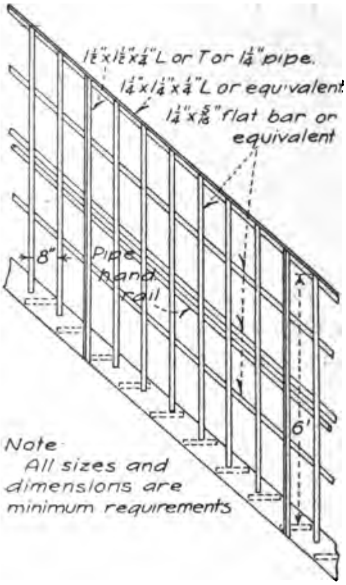
Every balanced stairway shall conform to the requirements for other stairways except that the stringers and the top rail may be lighter if they are properly trussed. The counterbalancing device shall be attached to both sides of the stairway equally, or a special attachment shall be used to prevent warping or twisting. The counterbalancing device shall operate gradually and easily as the live load is applied. Cable counterweights are not permitted.

Treads for "A" balanced stairways may be made as follows: two 1¼ x 1¼ x ¼ inch angles at front and back; two 1¼ x ¼ inch bars between, lying flatwise; one inch space between bars. Treads for "B" balanced stairways may be made as follows: two 1½ x 1½ x ¼ inch angles at front and back; two 1½ x ¼ inch bars between, lying flatwise; one inch space between bars. All such treads shall be strongly fastened together with cross bars not more than 14 inches apart.

Order 5128. Railings. Railings shall be provided on all open sides of platforms and stairways, and on both sides of balanced stairways. Either a railing or a handrail fastened to wall shall be provided on each side of all "B" fire escape stairways. Railings shall be at least 3 feet high, measuring vertically from floor of platform or from nose of step.

Every railing shall have posts, not more than 5 feet apart made of not less than 1½ x 1½ x ¼ inch angles or tees, or 1¼ inch pipe; top rail not less than 1¼ x 1¼ x ¼ inch angle or equivalent; center rail not less than 1¼ x 5-16 flat bar or equivalent. All connection shall be such as to make the railing stiff; two bolts (⅜ inch or larger) shall be used at the foot of each post wherever possible, or at least one ½-inch bolt shall be used. Railings shall be continuous. No projections on the inside of the railing shall be permitted. Where a railing returns to the wall, it shall be fastened thereto with a through bolt (at least ⅝ diameter), nut, and washer; or (in reinforced concrete) with an approved insert; or the railing shall be made equally secure with a diagonal brace extending at least 3 feet horizontally and 3 feet vertically.

All outside railings which are more than 60 feet above grade shall be at least 6 feet high, measuring vertically from floor of platform or from nose of step. Such railings shall be of special design approved by the Industrial Commission, having not less than four longitudinal rails, and vertical lattice bars not more than eight inches apart, and proper stiffening braces or brackets.


1½"x1½"x¼" L or T or 1¼" pipe.
1¼"x1¼"x¼" L or equivalent
1¼"x5/16" flat bar or equivalent
8"
Pipe hand rail
6'

Note
All sizes and dimensions are minimum requirements

RAILING FOR HIGH BUILDINGS

Order 5129. Ladder to Roof. Every fire escape which extends higher than the second floor shall be provided with a ladder leading from the upper platform to the roof, unless the fire escape stairway leads to the roof. The ladder shall have stringers not less than 1¼ inch pipe, or not less than 2 x ⅜ inch flat bars, at least 17 inches apart in the clear. The rungs shall be not less than ½ inch square or ⅝ inch around bars, 14 inches center to center. The stringers shall be securely tied together at intervals no greater than every fifth rung. The top rung of each ladder shall be not less than 4 feet above the roof coping, and the ladder shall return within 2 feet of the roof if the coping is more than 2 feet above the roof.

Order 5130. Standpipe. A standpipe shall be attached to every fire escape on every building of more than three stories not having an automatic sprinkler system; except that buildings requiring more than one fire escape on any side thereof, shall be provided with at least one standpipe on each side.

Every standpipe shall extend from a point within 5 feet of the ground to a point 3 feet above the roof or cornice, and shall be securely fastened to and accessible from each platform. The standpipe shall be made of not less than 3 inch wrought pipe, with 2½ inch outlet hose valve at each floor and at roof, and a double Siamese valve at the base of the pipe. All connections shall conform to the size and pattern used by the local fire department, and the entire standpipe shall conform to all requirements of such department.

Order 5131. Other Types of Fire Escapes. Sliding or chute fire escapes may be used, upon the approval of the Industrial Commission in place of "A" or "B" fire escapes. Every sliding fire escape shall be provided with a ladder constructed as in order 5129, extending from 5 feet above grade, to 4 feet above the roof coping.

SECTION 13. STANDARD EXIT DOORS.

Order 5132. Every door which serves as a required exit from a public passageway or stairway, or which forms a horizontal exit, shall be a standard exit door. See also orders 5406, 5511, 5608, 5713.

Every standard exit door shall swing outward or toward the natural means of egress (except as below and as in orders 5406, 5713). It shall be level with the floor, and shall be so hung that, when open, it will not block any part of the required width of any other doorway, passageway, stairway, or fire escape. No revolving door, (unless collapsible) and no sliding door, except where it opens onto a stairway enclosure, or serves as a horizontal exit) shall be considered as a standard exit door.

Note. Where revolving doors are used, it is recommended that swinging doors also be provided.

For doorways opening into a stairway enclosure, swinging doors are recommended, especially where used by more than 20 persons.

A standard exit door shall have such fastenings or hardware that it can be opened from the inside without using a key, by pushing against a single bar or plate, or turning a single knob or handle; it shall not be locked, barred, or bolted at any time while the building is occupied.

Note. For theaters, schools, large factories and hotels, etc., the "panic bolt" which operates by pressure against a bar or plate is recommended.

A standard exit doorway shall not be less than 6 feet 4 inches high by 3 feet 4 inches wide, except where especially provided (orders 5608, 5713). No such doorway or group of doorways shall be more than 6 inches narrower than the required width of the stairway or passageway leading thereto.

In every building which is used at night, a red exit light shall be placed over every emergency exit door and also over exery exit door where other doors or openings may cause confusion. (See also orders 5406, 5530, 5715).

SECTION 14. LOCATION AND MAINTENANCE OF EXITS.

Order 5133. Every exit mentioned in orders 5115—5132 shall lead to a street, alley or open court connected with a street. All such exits, and all passageways leading to and from the same, shall be kept in good repair and unobstructed at all times.

SECTION 15. STANDPIPES, FIRE EXTINGUISHERS, AND SPRINKLERS.

For exterior standpipes see order 5130.

Order 5134. Interior Standpipes. For the number and location of interior standpipes required in buildings of various classes, see the sections on standpipes in Parts V to VIII (orders 5411, 5533, 5621, 5726.)

Standpipes shall connect with city water mains or with an elevated tank of approved design and capacity, and shall be provided with hose and valve at each story, located not more than 5 feet above the floor.

The hose shall be not less than 1½ inches in diameter, and shall be kept connected, in good repair and working order, and ready for immediate use at all times.

Note. Unlined hose is recommended in buildings where such hose will not be used except in a rare emergency. Unlined hose is cheaper and does not deteriorate so rapidly. It is not suitable for continuous or frequent use.

The size of pipes and other details of installation, shall be as approved by the Industrial Commission.

An approved automatic sprinkler system will be accepted as a substitute for interior standpipes, except in theatres (orders 5533, 5535).

Note. The Industrial Commission will ordinarily approve any sprinkler or standpipe installation which is approved by the Underwriters.

Order 5135. Fire extinguishers. Where chemical fire extinguishers are required, they shall be of the 2½ gallon soda-acid type, or other type approved by the Industrial Commission. Soda-acid extinguishers shall be discharged and recharged at least once a year; others shall be charged as required.

Note. The Industrial Commission will ordinarily approve any extinguisher which bears the Underwriters' label. For the type best adapted to any particular situation, consult the local Fire Chief, or Underwriters, or the Industrial Commission.

Order 5136. Automatic Sprinklers. Where an automatic sprinkler system is required throughout the building (orders 5412, 5535), such system shall be supplied either from the city water mains or from a gravity or pressure tank. If city water supply of adequate volume and pressure is not available, a tank shall be provided.

Where automatic sprinklers are required in the basement only (order 5412), they shall be supplied from the city water mains. If there is no city water supply, such basement sprinklers will not be required. If in the future a city supply becomes available, then the basement sprinklers shall be installed.

Every basement sprinkler system shall also include sprinklers in all shafts (except elevator shafts) leading upward from the basement.

Every sprinkler system shall also have a suitable connection for the fire department. Where a complete sprinkler system is provided (whether required or not) exterior and interior standpipes may be omitted, except for interior standpipes in theaters. The number and location of sprinklers, size of pipe, size and location of tank (if any), and all other details of equipment, shall conform to the best standard practice.

Note. The Industrial Commission will ordinarily approve any sprinkler system which is approved by the Fire Underwriters.

The commission reserves the right to order a sprinkler system in any building, regardless of its height or number of persons, if the occupancy is especially hazardous.

Automatic sprinklers probably give the best fire protection for the least cost, for both life and property. They are recommended for use in hotels throughout the building, in basements of schools, public halls and theaters, and in most mercantile and factory buildings.

Explanatory.

The word "approved," as used in defining the foregoing standards, or in any other part of this code, means "approved by the Industrial Commission"; and any other discretionary power required or implied by any part of this code, lies with the Industrial Commission.

Part III

GENERAL REQUIREMENTS

Note. For general requirements on stairways, doors, fire escapes, standpipes, etc., see the definition of these terms, orders 5115—5136.

SECTION 1. DESIGN AND SUPERVISION OF BUILDINGS.

Order 5200. Every building shall be designed by a competent architect, engineer, or builder, in accordance with this code; and shall be constructed under the supervision of a competent superintendent or inspector, in accordance with the plans and specifications of the designer. The designer may also act as superintendent. No material change from the original plans and specifications shall be made except with the knowledge and consent of the designer. No owner shall construct any building or permit any building to be constructed except in accordance with this section.

Note. "By the term 'architect' above is meant 'registered architect.' The statutes contain the provision that 'no person doing business in this state shall use the term "architect" as a part of his business name or title, or in any way represent himself to be an architect, without a certificate of registration.' This does not prohibit a contractor or builder from drawing plans provided he does not term himself an architect in any way."

SECTION 2. HEIGHT AND CLASS OF CONSTRUCTION.

Order 5201. See also orders 5502—3, 5602, 5702—3. In a fireproof building exceeding 160 feet in height, all stairway and corridor windows and doors shall be standard fire windows and standard fire doors, except that the doors may contain glass as specified for standard fire windows. The stairway and corridor finish and floors shall be made entirely of incombustible material.

Note. This code sets no limit to the height of a fireproof building, as it is felt that this is a matter of general community welfare, rather than the safety of the individual occupant. The Industrial Commission strongly recommends that each municipality adopt such a limit before the rise in central land values makes such action a hardship to the property owner.

size of pipe, size and location of tank (if any), and all other details of equipment, shall conform to the best standard practice.

Note. The Industrial Commission will ordinarily approve any sprinkler system which is approved by the Fire Underwriters.

The commission reserves the right to order a sprinkler system in any building, regardless of its height or number of persons, if the occupancy is especially hazardous.

Automatic sprinklers probably give the best fire protection for the least cost, for both life and property. They are recommended for use in hotels throughout the building, in basements of schools, public halls and theaters, and in most mercantile and factory buildings.

Explanatory.

The word "approved," as used in defining the foregoing standards, or in any other part of this code, means "approved by the Industrial Commission"; and any other discretionary power required or implied by any part of this code, lies with the Industrial Commission.

Part III

GENERAL REQUIREMENTS

Note. For general requirements on stairways, doors, fire escapes, standpipes, etc., see the definition of these terms, orders 5115—5136.

SECTION 1. DESIGN AND SUPERVISION OF BUILDINGS.

Order 5200. Every building shall be designed by a competent architect, engineer, or builder, in accordance with this code; and shall be constructed under the supervision of a competent superintendent or inspector, in accordance with the plans and specifications of the designer. The designer may also act as superintendent. No material change from the original plans and specifications shall be made except with the knowledge and consent of the designer. No owner shall construct any building or permit any building to be constructed except in accordance with this section.

Note. "By the term 'architect' above is meant 'registered architect.' The statutes contain the provision that 'no person doing business in this state shall use the term "architect" as a part of his business name or title, or in any way represent himself to be an architect, without a certificate of registration.' This does not prohibit a contractor or builder from drawing plans provided he does not term himself an architect in any way."

SECTION 2. HEIGHT AND CLASS OF CONSTRUCTION.

Order 5201. See also orders 5502—3, 5602, 5702—3. In a fireproof building exceeding 160 feet in height, all stairway and corridor windows and doors shall be standard fire windows and standard fire doors, except that the doors may contain glass as specified for standard fire windows. The stairway and corridor finish and floors shall be made entirely of incombustible material.

Note. This code sets no limit to the height of a fireproof building, as it is felt that this is a matter of general community welfare, rather than the safety of the individual occupant. The Industrial Commission strongly recommends that each municipality adopt such a limit before the rise in central land values makes such action a hardship to the property owner.

Buildings of mill construction shall not be higher than 85 feet above the grade.

Buildings of ordinary construction shall not be higher than 60 feet above the grade.

Frame or veneered buildings shall not be higher than 40 feet above the grade.

Roof appendages such as dormer windows, domes, towers, tanks, other than sprinkler tanks, turrets, spires, skylights, monitors, penthouses or other projections above the main roof of a building shall not exceed in total area 20 per cent of the main roof, otherwise the building height limit shall apply to the roof of such appendage.

No appendage, except sprinkler tanks, on the roof of a building of mill construction shall exceed a height of 110 feet above the grade.

No appendage, except sprinkler tanks, on the roof of a building of ordinary construction shall exceed a height of 80 feet above the grade.

No appendage, except sprinkler tanks, on the roof of any frame or veneered building shall exceed a height of 50 feet above the grade; the walls and roof of all such appendages shall be covered with incombustible material.

A spire which does not exceed in total area 20 per cent of the main roof will be excepted from the above limitations of height provided the following requirements are met with:

(1) The spire must be supported by masonry foundations and walls designed to support it independent of the rest of the building.

(2) The masonry wall of the spire must extend at least as high as the ridge of the roof of the main building.

(3) The spire must be protected against lightning.

Penthouses containing elevator machinery shall be constructed as required by the Elevator Code issued by the Industrial Commission.

In every building more than four stories in height, all outside doors and windows shall be standard fire doors and standard fire windows, if they are less than 15 feet away from any adjoining lot line or from the center of an adjoining alley, or if they are less than 30 feet away from any other building; but this shall not apply to walls, windows and doors which lie in the same or parallel planes facing in the same direction.

Note. The Industrial Commission reserves the right to require fire doors and windows in any building where the hazard is great.

Any portion of a building which is of inferior type of construction or which is exposed to special fire hazard, shall be isolated by means of standard fire walls or fireproof enclosure, or partitions, and fire-resisting ceilings, floors and doors, or as directed by the Industrial Commission.

SECTION 3. FLOOR AREAS.

Order 5202. The maximum undivided floor area in any building more than one story in height shall be as follows:

Fireproof construction	18,000 square feet
Mill construction	10,000 square feet
Ordinary construction	7,500 square feet
Frame buildings	5,000 square feet

The areas in the foregoing table may be increased as follows:

In two-story buildings, by 50 per cent.

In frame buildings, and in buildings of ordinary and mill construction, equipped with an approved automatic sprinkler system, by 66 2-3 per cent. In buildings of fireproof construction, equipped with an approved automatic sprinkler system by 50 per cent.

In buildings fronting on at least three streets, or two streets and an alley, by 20 per cent.

Every such increase shall be computed on the original maximum area. The increases are cumulative. The above limits of area for two-story buildings shall also apply to one-story buildings within the corporate limits of any city or village, except that where both the building and its contents are practically incombustible such area may be increased if approved in writing by the Industrial Commission.

Where a dividing wall is required in any building such wall shall be of solid incombustible fire resisting material of the same thickness as required for enclosing walls (orders 5304—

5310); and shall be continuous from the foundation to the roof, in a fireproof building, or to 3 feet above the roof in a non-fireproof building. Each opening in a division wall shall have a standard fire door on each side of the wall.

SECTION 4. WINDOWS AND COURTS.

Order 5203. Windows. Every room in which one or more persons live, sleep, or are employed, (except storage rooms or other rooms where the nature of the occupancy will not permit) shall be lighted by a window or windows opening directly upon street or alley or upon a court on the same lot with the building. The windows shall be so constructed and distributed as to afford proper light and ventilation. Every building more than 40 feet deep (measuring at right angles to the windows) shall have windows on at least two sides.

Note. For toilet room windows see order 5253.

Order 5204. Definitions of Courts. By inner court is meant an open air shaft or court surrounded on all sides by walls.

By inner lot line court is meant a court bounded on one side and both ends by walls and on the remaining side by a lot line.

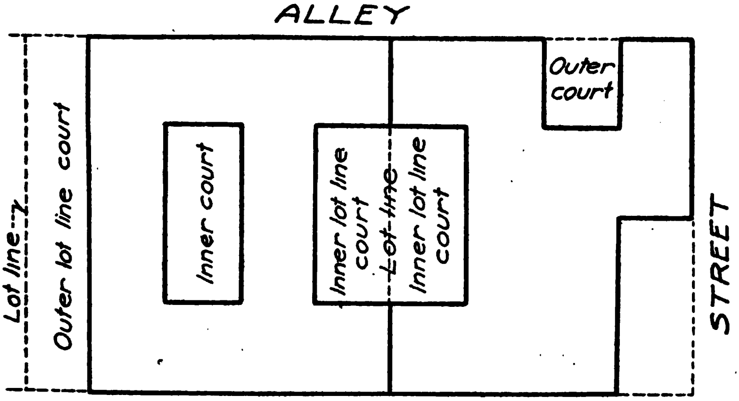
By outer court is meant a court extending to a street, alley, or open space not less than 15 feet wide.

By outer lot line court is meant a court with one side on a lot line and opening to a street or open space not less than 15 feet wide.

In applying the following requirements, a building from 30 to 43 feet high shall be considered as having at least three stories, and each additional 13 feet shall be considered an additional story.

Order 5205. Size of Courts. No outer lot line court, measured from the lot line to the wall of the building, shall be less than 3 feet wide for a court two stories or less in height and 40 feet or less in length. For each additional story in height, the width of such court shall be increased one foot; and for each additional 15 feet or fraction thereof in length, the width of such court shall be further increased one foot.

No outer court between wings or parts of the same building, or between different buildings on the same lot, shall be less than 6 feet wide for a court two stories or less in height and 40 feet or less in length. For each additional story in height, the width of such court shall be increased one foot; and for each additional 10 feet or fraction thereof in length, the width of such court shall be further increased one foot.



COURTS

In the case of an outer court or an outer lot line court which is open at each end to a street or open space not less than 15 feet wide, the above lengths may be doubled.

No inner lot line court shall be less than 6 feet in width, or less than 60 square feet in area, for courts two stories or less in height, except that an inner lot line court one story high shall be not less than 4 feet wide and not less than 40 square feet in area; and for every additional story every such inner lot line court shall be increased by at least one lineal foot in its length and one lineal foot in its width.

No inner court shall be less than 10 feet in width nor less than 150 square feet in area for courts two stories or less in height; and for every additional story every such inner court shall be increased by at least one lineal foot in its length and one lineal foot in its width.

No court shall be covered by a roof or skylight but the entire required area shall be open and unobstructed from the bottom thereof to the sky. No fire escape or stairway shall be constructed in any court unless the court be enlarged proportionately.

All walls of inner courts whose least horizontal dimension is less than one fourth the height, shall be faced with material with a permanent white surface or shall be painted white at least every two years.

No buildings shall be altered or enlarged to encroach upon space reserved under this code for light and air on the lots or parcels of ground on which such building is erected.

Order 5206. Ventilation of Courts. At the bottom of every shaft or inner court there shall be sufficient access to such shaft or court to enable it to be properly cleaned out. Every inner court which is required under order 5203 and which is more than one story in height shall have an intake for fresh air, leading from the street or other open space. The area of such intake in square feet shall equal at least two one thousandths of the number of cubic feet contained in said court; but such area need not be more than 50 square feet. Every intake shall be constructed of fireproof material and unless said intake is used as a passageway for persons, there shall be no openings into the same other than the inlet and outlet.

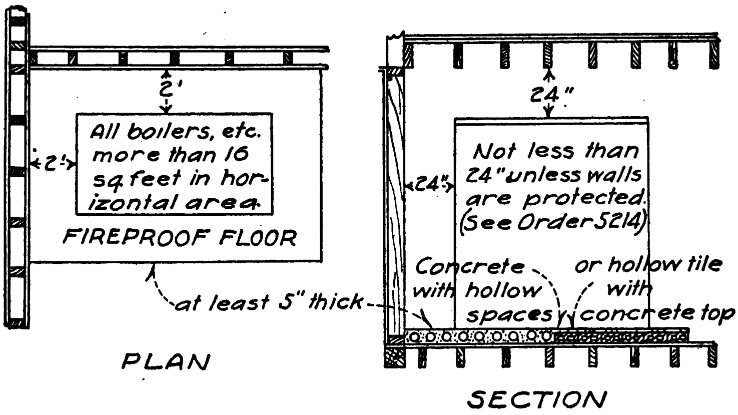
SECTION 5. BOILERS, FURNACES AND STOVES.

Order 5210. Fireproof Room. Every boiler operating with more than 15 pounds steam pressure per square inch shall, together with furnace and breeching, be enclosed with a standard fireproof enclosure and fireproof ceiling and floor, or be located in a separate building, or be separated from the remainder of the building by a division wall as described in order 5202.

See also orders 5527, 5617, 5720.

Order 5211. Protection of Floor. Every boiler, furnace or oven shall be placed on a fireproof floor projecting at least two feet on all sides. Such floor shall also be provided for every coal, wood, or oil stove or range which is more than 16 square feet in horizontal area or which has a flame at the bottom. If any such floor rests on or is in contact with any combustible material, then the fireproof floor layer shall be at least 5 inches thick and shall be hollow, with air spaces running horizontally through the same. The air spaces shall be open at both ends and shall be so placed that air can circulate through them; the horizontal area shall equal at least ½ the horizontal area of the fireproof slab.

Note. The purpose of these air spaces is to permit air to circulate through the fireproof slab and keep down its temperature. When a range or a heater rests on a solid layer of brick or concrete, it has **been found that after several months the heat strikes through to the** wood below. Many fires have been caused in this way.


2'
2'
All boilers, etc. more than 16 sq feet in horizontal area
FIREPROOF FLOOR
at least 5" thick
PLAN
24"
24"
Not less than 24" unless walls are protected. (See Order 5214)
Concrete with hollow spaces
or hollow tile with concrete top
SECTION

The air spaces may be secured by using hollow tile placed end to end; or by imbedding wrought or sheet iron pipes (say 2 inch diameter, or larger) in a layer of concrete. The air spaces should run parallel to the short dimension of the slab.

If the stove, range, etc., is raised at least 6 inches above the floor and such air space is not enclosed, then the fireproof floor layer may be reduced to not less than 2 inch solid thickness, without air spaces, provided it is covered with sheet metal.

Every coal, wood, or oil stove or range not more than 16 square feet in horizontal area and not having a flame at the bottom shall, if placed on a combustible floor, be raised at least 6 inches above the floor, and such air space shall not be enclosed. Such floor shall be protected with a stove board of sheet metal or asbestos, projecting at least one foot on all sides.

Note. A double-shell heating furnace or stove, located in the room which it is designated to heat, is considered a "stove."

Gas stoves shall be protected as above specified, except that

(1) a three inch solid fireproof floor layer, projecting at least 6 inches on all sides, shall be sufficient protection if the stove has a false bottom at least 3 inches above such fireproof floor; and

(2) if the stove is less than 16 square feet in horizontal area and has a false bottom at least 5 inches above the floor, no fireproof floor shall be required.

Order 5212. Protection of Walls and Ceiling. No boiler, furnace, oven, stove, or range, whether encased or not, shall be placed less than 24 inches away from any non-fireproof wall, partition or ceiling; except that such distance may be reduced to 12 inches if the wall, partition, or ceiling is protected with at least ¼ inch asbestos board covered with galvanized sheet metal, or with equivalent protection as specified in order 5112.

The above distances may be reduced one-half in the case of stoves and ranges less than 16 square feet in area, and also in the case of gas ranges of greater area if proper insulation is incorporated in the back of the range.

The top of every boiler, furnace or oven, shall be covered with asbestos, sand, or other heat resisting material, or the required distance above same shall be increased 100 per cent.

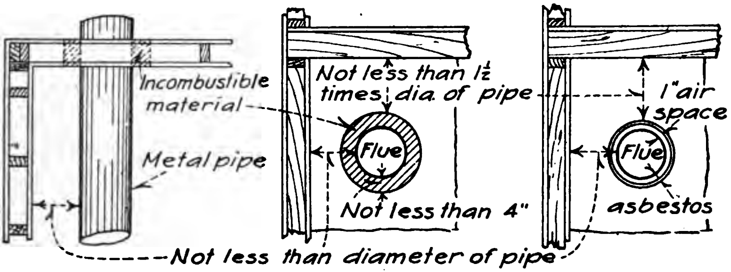
SECTION 6. SMOKE PIPES.

Order 5213. No smoke pipe shall pass through any floor, outside window or door, nor through any combustible roof or combustible outside wall, nor through any closet, attic or similarly concealed space.

Every smoke pipe passing through a non-fireproof partition shall be encased with incombustible material at least 4 inches thick or with a double safety thimble made of two concentric rings of sheet metal with at least one inch open air space between and with the outer ring covered with at least ¼ inch asbestos.

Note. The double thimble is of no value unless it is kept free from dirt. The best protection is a casing of solid masonry, with ¼ inch space between the masonry and the pipe.

No part of any smokepipe shall be placed nearer to any non-fireproof partition or wall than the diameter of the pipe, nor nearer to any non-fireproof ceiling than one and one-half times the diameter; but the above distances may be reduced by one-half, if the wall or ceiling is covered with not less than ¼ inch asbestos board covered with galvanized sheet metal, or with equivalent protection as specified in order 5112.



Incombustible Fill Metal thimble

PLAN SECTIONS

METAL SMOKEPIPE INSULATION

SECTION 7. STEAM PIPES.

Order 5214. No steam pipe shall be placed within one inch of any woodwork. Every steam pipe passing through a combustible floor, ceiling or partition, shall be protected by a metal tube one inch larger in diameter than the pipe, and shall be provided with a metal cap. All wooden boxes or casings enclosing steam pipes, or wooden covers to recesses in walls in which steam pipes are placed, shall be lined with metal.

Note. A careful investigations has shown that steam pipes in contact with wood or similar material form a real fire hazard. There are a large number of cases on record where steam pipes, even under low pressure, have gradually caused the formation of charcoal and eventually a fire has resulted. The fatal Collinwood school fire probably started in this way.

SECTION 8. AIR PIPES AND REGISTERS.

Order 5215. Hot Air Pipes. Every hot air pipe contained in or passing through a combustible partition or floor shall be placed inside another pipe arranged to maintain a ¼ inch air space between the two pipes on all sides; or the pipe shall be securely covered with ¼ inch corrugated asbestos. The bend at the bottom of the vertical pipe shall be kept at least 2 inches from any woodwork.

Note. Where a hot air pipe is placed in a 4 inch partition, metal lath over the pipe is recommended.

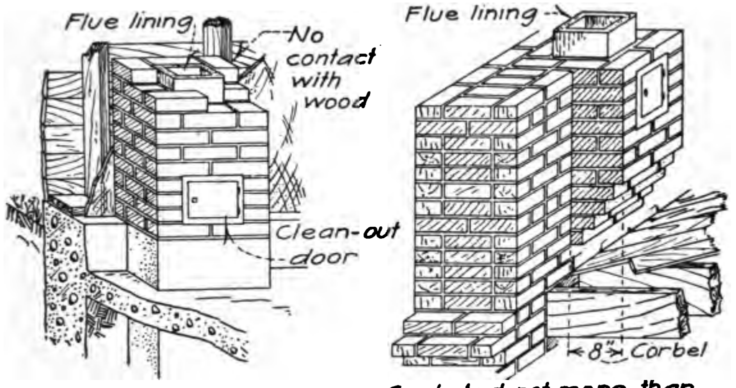
Order 5216. Registers. All register boxes shall be of metal, and shall either be double or be covered with asbestos not less than ⅛ inch thick.

Order 5217. Hot Air and Ventilating Flues. Every vertical hot air and fresh air flue or group of flues in the school, theater and hotel groups (see Order 5008) shall be enclosed with, or constructed of, incombustible material at least 2 inches thick, lined with metal or smoothly finished on the inside; except that frame buildings not more than two stories in height may have metal flues if protected as in order 5215. Horizontal ducts for hot air and fresh air, and all vent flues shall be constructed as in order 5215, or better.

SECTION 9. CHIMNEYS.

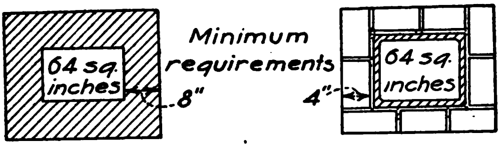
Order 5218. Construction and Foundation. Every chimney shall be built of brick or other approved fireproof material. No chimney shall rest upon a flooring of wood nor shall any wood be built into or in contact with any chimney. The foundation of every chimney, flue, or stack, shall be designed and built in conformity with the requirements for foundations of buildings. In no case shall a chimney be corbeled out more than 8 inches from the wall, and in every such case the corbeling shall consist of at least five courses of brick. Portland cement mortar shall be used above the roof line.

Note. Smoke flues located inside of foul air flues should be of metal as required in order 5222, or of approved tile suitable for such flue purposes. Due to exposure of flue to weather and gases, and the inaccessibility of the flue for replacement, metal should not be lighter than 16 gauge.



ON MASONRY FOUNDATION

Corbeled not more than 8" with not less than 5 courses of brick
CORBELED



Solid Masonry

Brick with Flue Lining

CHIMNEYS

Order 5219. Minimum Thickness and Height. Every non-metallic chimney shall have walls at least 8 inches thick, unless a terra cotta, fire clay or other approved flue lining is used for the full height of the chimney, in which case the walls shall not be less than 4 inches thick. No smoke flue shall have a cross sectional area less than 64 square inches, except that flue linings 7" x 7" inside, or 8 inches in diameter inside, may be used. Concrete blocks shall not be used in chimney construction unless flue lining is used.

The top of every chimney shall be at least 5 feet above the top of the building of which it is a part, if the roof is flat, or at least 2 feet above the ridge if the roof is pitched. Every chimney shall be provided with a cleaning-out door at its base.

Vent pipes from gas stoves should be of tile and not less than 4 inches inside diameter.

Order 5220. Flues of More than 260 square inches. Chimneys with flues larger than 260 square inches shall have surrounding walls not less than 8 inches thick. The top of such a chimney shall be at least 8 feet above the roof.

Order 5221. Minimum Thickness to be Increased. Every chimney shall be designed throughout (the above minimum thicknesses being increased where necessary) in accordance with the requirements of the structural design of buildings and with the best engineering practice.

Order 5222. Metallic Smoke Stacks. No metallic smoke stack shall pass through any non-fireproof floor, ceiling, or roof, unless encased or lined with brick or other fireproof material of the same character and thickness as prescribed for non-metallic chimneys; or in place thereof, where such metallic chimney passes through the roof only, the chimney shall be separated from the roof by a 12 inch air space.

Order 5223. Wind Pressure. Every chimney shall be designed to withstand a wind pressure of at least 30 pounds per square foot. In circular chimneys such pressure shall be assumed to act over not less than one-half of the diametrical area.

Note. Metal chimneys held by cable guys should have at least four (preferably five) guys. The following example will illustrate the size of cables needed.

Assume a chimney 70 feet high and 30 inches in diameter; guys attached 20 feet below top of chimney; slope of guys, 30 degrees with the horizontal (that is, guys reach the ground about 85 feet from the chimney). The guys should then be not less than one-half inch galvanized cables or two sets of ⅜ inch cables could be used. Proper anchors must be provided which will develop the full strength of the cable.

It is very important that guys be so arranged that they will not become weakened by chafing. If the guy is fastened to an eyebolt it should be protected by a steel shield which will take the wear.

SECTION 10. LIGHTS.

Order 5224. Oil lamps shall not be used when gas or electricity is available, except in private apartments.

Gas and oil lights shall be placed at least 6 feet above the floor level, at least 6 inches from any combustible partition or wall, and at least 2 feet (measured from top of flame) below any combustible ceiling unless properly protected by a metal shield with at least 2 inches of air space above. Swinging brackets shall be provided with a guard or stop so that the light cannot come nearer to the partition or wall than one foot. In aisles and public passageways, every such light shall be protected by an incombustible guard unless the light is at least 6 feet 6 inches above the floor.

Note. Especial care should be taken to prevent curtains or draperies from coming into contact with a flame. Gas and oil lights should be kept at least two feet away from any door or window where curtains are used.

Every gas supply main shall have a service cock outside of the building, so placed and maintained that it can be shut off at any time without entering the building.

See also orders 5410, 5529—31, 5715.

Note. Most large cities now require a specially designed cock which does not become clogged with rust or ice, and which can easily be located and shut off by the firemen. This is very desirable as many small fires have become serious through the breaking of gas pipes in the building.

SECTION 11. ELECTRICAL WORK.

Order 5225. All electrical work shall conform to the 1918 National Electrical Code (on file at the office of the Industrial Commission) except where the same conflicts with any order of the Industrial Commission.

All wiring for lighting and power purposes in schools, theaters, assembly halls, hotels, hospitals and public garages shall be placed in conduit; except that this requirement need not apply to wiring for lighting purposes in schools and assembly halls of frame construction.

See also order 5543 (motion picture booths).

Note. Brass shell sockets should not be placed in basements or in any other damp room of any building. All lights in toilet rooms, lavatories and bath rooms should be controlled by wall switches.

SECTION 12. SPECIAL HAZARDS.

Order 5230. Laundry Drying Rooms. Every laundry drying room shall be of fireproof construction, with all interior openings protected by standard fire doors.

No heating appliance burning fuel shall be used in any such room.

(For laundry requirements in schools, hotels, etc., see orders 5617 and 5720).

Order 5235. Dry Cleaning Establishments. Every dry cleaning establishment shall be of fireproof construction, and shall not be more than three stories in height. A building not more than one story in height shall be either a separate building, or a separate portion of a building, isolated by means of standard fire walls, all openings in which are protected by automatic standard fire doors where sills are not less than 6 inches above the floor.

Exception. Wood roof may be used on one story buildings if they are at least 15 feet from any other building.

A building more than one story in height shall be occupied exclusively by the dry cleaning establishment.

The lowest floor of any building used for dry cleaning shall be above grade and there shall be no basement or other open or air space below such floor line. All windows, doors or other openings within 50 feet from any other building shall be protected by standard fire doors or standard windows. Doors in outside walls shall have sills flush with floor level.

An efficient ventilating system shall be provided for all wash rooms and drying rooms in every dry cleaning establishment. Unless an exhaust system with fan in continuous operation is installed, a gravity ventilating system with vent openings at floor and ceiling must be provided.

See also General Orders on Fire Prevention issued by the Industrial Commission.

Order 5240. Public Garages. A public garage is any building which accommodates more than two automobiles, motorcycles, tractors or other motor driven vehicles designed to use volatile inflammable liquid for fuel or power, except that buildings in which such new motor vehicles which do not contain oil, volatile inflammable liquid or storage batteries are stored, need not be included in this classification.

All public garages shall have walls and roof of ordinary construction or better.

All floors of storage rooms, sales rooms, and repair shops in public garages shall be of fireproof construction; except that the floors of garages not more than 3 stories in height may have floor panels of protected construction. See order 5100-A.

Where public garages are built in connection with buildings used for other purposes they shall be separated therefrom by means of standard fire walls, and unpierced fireproof floors and ceilings; except that where the second floor consists of only one apartment covering not more than 1,000 square feet of floor area the ceiling of garages may be semi-fireproof.

All walls, or parts of walls of public garages nearer than 5 feet to any other building or boundary line between premises shall be unpierced; all walls, or parts of walls nearer than 10 feet to any other building or boundary line between premises shall have all openings protected by means of standard fire windows and standard fire doors.

Parapet walls shall be provided as described in order 5310.

For electrical wiring see Order 5225.
For parapet wall requirement see Order 5310.
See also General Orders on Fire Prevention issued by the Industrial Commission.
For private garages see Order 5006.

NOTE ON ELEVATORS AND ELEVATOR ENCLOSURES.

. See elevator code issued by the Industrial Commission.

SECTION 13. TOILET ROOMS.

These orders are enforced jointly by the Industrial Commission and the State Board of Health.

For the number of closets and urinals required in buildings of various classes see orders 5532, 5618, 5722, 2203.

For detailed requirements regarding fixtures, piping, etc., see State Plumbing Code issued by the State Board of Health.

Approval by an "authorized agent" means

1. By a plumbing inspector of the State Board of Health or a deputy of the Industrial Commission.
2. By the city building department or city health department where such department, acting under the provisions of a city ordinance, issues an order or a permit for the work in question; or
3. By the city plumbing inspector in cases not covered by 2.

Order 5250. Toilet Rooms Required. Every place of employment and every public building hereafter constructed (including all buildings covered by the State Building Code), shall have adequate toilet rooms, completely enclosed, and so arranged as to insure privacy; except that where no dust prevails in foundries, rolling mills, blast furnaces, tanneries, and such other similar buildings as are specified by the Industrial Commission, partitions enclosing toilets shall be at least seven feet high but need not be carried to the ceiling nor enclosed at the top, provided such ceiling is at least fifteen feet high, and provided such toilets are located in rooms which females are not allowed to enter.

Note. The above exception will be permitted even though the ceiling is lower than 15 feet, if local ventilation through the closet bowl is provided in a manner approved by the Industrial Commission or the State Board of Health.

Toilet rooms should, if possible, be placed on each occupied floor, especially in factories. Much time may thus be saved.

Order 5251. Toilet Rooms for the Two Sexes. Where the two sexes are accommodated, separate toilet rooms shall be provided, except

(1) In apartment houses;

(2) If approved in writing by the Industrial Commission or the State Board of Health, or their authorized agents, in buildings accommodating not more than five persons of both sexes, provided the door of such toilet room is kept locked and the key is kept in a place accessible to all such persons. But whenever the number of such persons shall exceed five, separate toilet rooms shall be provided.

Entrances to toilet rooms for the two sexes shall be properly separated, by screens or otherwise, and shall, wherever possible, be at least twenty feet apart.

Order 5252. Sex Designated. Wherever women are employed or accommodated, each toilet room shall be distinctly marked with regard to the sex which uses it, and no person shall be allowed to use a toilet room assigned to the other sex, except as provided in order 5251.

Order 5253. Location, Light, Ventilation. Every toilet or bathroom shall be so located as to open to outside light and air, by windows and skylights opening directly upon a street, alley, court, or vent shaft, except as hereinafter provided. Every such vent shaft shall have a horizontal area of at least one square foot for each water-closet or urinal adjacent thereto, but the least dimension of such shaft, if one story high, shall not be less than three feet; if two stories high, not less than four feet; and one foot additional for each additional story.

The glass area for a toilet room containing one closet or urinal shall be at least 4 square feet, with 2 square feet additional for each additional closet or urinal.

In addition to the windows herein required, each toilet room which contains more than three fixtures (closets and urinals) shall have a vent flue of incombustible material, vertical or nearly so, running through the roof with a cap or hood of the siphon type, or its equivalent, and the vent shall be not less than the following sizes:

Four fixtures	8 inch pipe
Five or six fixtures	10 inch pipe
Seven to ten fixtures	12 inch pipe

But if the windows or skylights can not be opened, then vent pipes shall be provided as specified in order 5254.

No toilet room shall have a movable window or ventilator opening on any elevator shaft, or any court which contains windows of sleeping or living rooms above; except that a toilet room containing not more than two closets may have a movable window on such court, provided such room has a vent flue running above the roof.

Order 5254. Location Without Outside Windows—When Permitted. If a location with outside windows is impracticable, a different location will be permitted, as follows:

(1) For a toilet used by not more than three persons,—without special permit.

(2) For a toilet in a new building, used by more than three persons,—only with the written approval of the Industrial Commission or the State Board of Health, or their authorized agents.

(3) For a new toilet in an existing building, used by more than three persons,—only with the written approval of the Industrial Commission or State Board of Health, or their authorized agents.

Such approval shall be granted only where a location with outside windows is not reasonably possible.

Where a toilet room without outside windows is permitted, it shall have a fixed window or windows to an adjoining room, with glass area as provided above, arranged so as to furnish as much light as possible. Frosted or other translucent glass shall be used when necessary for privacy. In no case shall the floor be of wood. A vent flue of incombustible material shall be provided, vertical or nearly so, running through the roof, with a cap or hood of the siphon type, or its equivalent, and the vent shall be not less than the following sizes:

One fixture (closet or urinal)	6 inch pipe
Two fixtures	8 inch pipe
Three fixtures	10 inch pipe
Four or five fixtures	12 inch pipe
Six or seven fixtures	14 inch pipe
Eight or ten fixtures	16 inch pipe

Notes. (1) Glass area 50 per cent greater than required, is recommended.

(2) An air inlet is recommended if it can be made soundproof.

(3) A fan in the flue will be required if necessary for proper ventilation. If there is no fan, a steam coil, or even an electric light at the bottom of the flue, will help to produce circulation. Where a metal vent pipe extends above the roof, a double pipe or other insulation against cold, is recommended.

(4) Closets provided with a local vent are recommended and may be required in some cases before approval is granted.

Order 5255. Artificial Light. Every toilet room (except in a private apartment) shall be artificially lighted during the entire period that the building is occupied, wherever and whenever adequate natural light is not available, so that all parts of the room are easily visible.

Order 5256. Size. Every toilet room shall have at least 10 square feet of floor area, and at least 100 cubic feet of air space, for each water-closet and each urinal.

Order 5257. Floor. The floor and base of every toilet room shall be constructed of material (other than wood) which does not readily absorb moisture and which can be easily cleaned; except that wood floors may be used

(1) In private apartments;

(2) If approved in writing, by the Industrial Commission or the State Board of Health, or their authorized agents, in existing buildings where there is an existing wood floor in good condition and where such toilet will be used by not more than five persons, provided further that such room must have an outside window or skylight.

Note. To make a concrete floor non-absorbent, the concrete must be a dense, rich mix, finished smooth, and should be kept painted.

Order 5258. Walls and Ceilings. The walls and ceiling of every toilet room shall be completely covered with smooth cement or gypsum plaster, glazed brick or tile, galvanized or enameled metal, or other smooth, non-absorbent material. Wood may be used if well covered with two coats of body paint and one coat of enamel paint or spar varnish. But wood shall not be used for partitions between toilet rooms, nor for partitions which separate a toilet room from any room used by the opposite sex. All such partitions shall be as nearly soundproof as possible.

Note. The above is not intended to prohibit the use of ordinary stud partitions between rooms if partitions are lathed and plastered on both sides.

Walls and partitions should be of light color to increase illumination and facilitate cleaning.

In large rooms a hose connection and a floor drain should be provided.

Order 5259. Partitions Between Fixtures. Adjoining water-closets shall be separated by partitions. Each individual urinal or urinal trough shall be provided with partition at each end and at the back, to give privacy. Where individual urinals are arranged in batteries, a partition shall be placed at each end and at the back of the battery. A space of 6 to 12 inches shall be left between the floor and the bottom of each partition. The top of the partition shall be from 5½ to 6 feet above the floor. Doors, with the top 5½ feet above the floor, and the bottom 6 to 12 inches above the floor, shall be provided for all water-closet compartments. All partitions and doors shall be of material and finish required by order 5258 for walls and ceilings.

Note. Wood is not recommended; if used, it should be hardwood.

Water-closet compartments shall be not less than 30 inches in width, and shall be sufficiently deep to permit the door to swing past the fixture when opened. Doors must swing inward.

Recommendation: It is recommended that doors be equipped with a spring or other device so that they will remain open when compartment is vacant and will need to be latched to hold shut when compartment is occupied.

Order 5260. Fixtures. Only individual water-closets of porcelain or vitreous chinaware shall be used. (See State Plumbing Code, sections 51-54, for further details, also for type of frost-proof closets permitted.) Water-closet seats shall be of wood or other non-heat-absorbing material, and shall be finished with varnish or other substance so as to be impervious to water.

Urinals shall be made of material impervious to moisture, and of such design, materials, and construction that they may be properly flushed and kept in a sanitary condition.

In all new installations in schools, theatres, hotels, office buildings, mercantile buildings, libraries and museums, or similar public buildings, only individual urinals shall be used. Such individual urinals shall be of porcelain or vitreous china, set into the floor, the floor graded toward the urinal, and shall be equipped with an effective automatic tank or valve or satisfactory foot operating flushing device.

This order shall be enforced on new contracts and new construction after January 1, 1922.

Order 5261. Protection from Frost. All water-closets and urinals and the pipes connecting therewith shall be properly protected against frost, either by a suitable insulating covering, or by providing and operating a suitable heating apparatus, or in some other approved manner; so that such water-closets and urinals will be in proper condition for use at all times.

Note. Toilets should be adequately heated in cold weather. Heating equipment should be arranged to permit cleaning of floors and walls.

Order 5262. Where No Sewer System is Available. Each water-closet and urinal and each lavatory or slop sink located in a toilet room, shall be connected with a sewer system, where a sewer system is available. In locations where a sewer system is not available, or cannot be made available, the disposal of human waste may be accomplished as follows:

(1) Sewage treatment tank and disposal system.

Note. For detailed requirements on such systems, see State Plumbing Code.

(2) Where the local conditions make it impractical to install such system, outdoor toilets (see order 5263) or other facilities permitted by the State Board of Health may be used; provided that in the case of places of employment for more than ten persons, schools larger than one room, and apartment or tenement houses, water flush toilets as herein described shall be provided, unless outdoor toilets or other facilities are permitted in writing by the Industrial Commission or the State Board of Health.

Order 5263. Outdoor Toilets. Outdoor toilets shall comply with orders 5250 to 5259, inclusive, and in addition shall be

(1) Located on ground that is well drained, and where there is no possibility of contaminating any drinking water supply.

(2) Provided with suitable approach, such as concrete, gravel or cinder walk.

Note. For schools a concrete walk is recommended.

(3) The foundations shall be of concrete or other masonry.

(4) The vault shall extend at least 6 inches above ground, be as dark as possible, and be proof against entrance by flies, rats, or other vermin. The upper portion shall be of concrete, or of brick or stone laid in cement mortar. If in damp ground the entire vault shall be of concrete, or brick or stone laid in cement mortar.

(5) All windows, ventilators and other openings shall be screened to prevent the entrance of flies, and all doors shall be self-closing. A separate ventilator shall be provided for the vault and shall extend above the roof and be provided with an effective ventilating hood.

(6) The entire installation must be kept clean and sanitary. Milk of lime (freshly slaked lime) or other equally effective disinfectant must be used in the vault and in the urinal trough in sufficient quantities, and at frequent intervals. The floors, seats and urinals must be scrubbed as often as necessary. The vault must be cleaned out at proper intervals.

Note. See the Wisconsin Code for Rural School Privies issued by the State Board of Health.

Order 5264. All Toilets, Cleanliness. Every toilet room and every part thereof, including walls, floors and ceiling, and all fixtures therein, must be kept clean, efficient, and in good repair. In each toilet room sufficient toilet paper must be provided, and it must be made of material which will not obstruct the fixtures in such toilet room.

Order 5265. Indecent Pictures. Indecent or suggestive marks, pictures, or words are forbidden in toilet rooms, and such defacement when found must be at once removed.

Order 5266. Service Closet. Where practical a service closet conforming with requirements for construction of toilet rooms shall be provided and supplied with mop, broom, bucket, soap, toilet paper, and toweling necessary for sanitary upkeep of toilet rooms.

EXTRACT FROM GENERAL ORDERS ON SAFETY

Order 56.—Window Cleaners. In all public buildings and places of employment every window above the first story, or where the top of the window is more than 20 feet from the ground, except windows which are cleaned from within, must be provided with an efficient safety device to protect the window cleaner. Such safety device must consist of:

(a) A safety belt must be provided for each window cleaner, which belt must be fastened at each end to a permanent attachment which must be bolted through the window frame and be secured by a nut and washer on the inside; or

(b) A substantial, movable platform which is projected through the window for the window cleaner to stand upon and which is provided with a substantial railing; or

(c) Other equally efficient device.

Part IV

STRUCTURAL DESIGN

Only the most general features of structural design are touched on in this code. Detailed requirements may be adopted by cities if they desire. Such details are beyond the scope of this code and would be of no particular benefit. "Rules cannot produce or supersede judgment; on the contrary, judgment should control the interpretation and application of rules," whether the rules are general or detailed.

Either safety or economy, and often both, will be sacrificed unless both the designer and the builder have a competent knowledge of building construction in general and of the particular kind of construction which is being used.

Such details as are given in the following orders are typical, not restrictive. The Industrial Commission will, on application, approve any other type of design which affords equal strength and security in accordance with standard practice. See under "Appeal," p. 9.

SECTION 1. FLOOR AND ROOF LOADS.

Order 5300. The minimum stresses to be resisted by any structure shall be calculated by adding to the weight of the structure, called dead load, the following superimposed live loads uniformly distributed in pounds per square foot of horizontal area.

Theaters, Assembly Halls, and other places of assemblage:—	
Auditorium with fixed seats	70
Lobbies, passageways, stairways and auditoriums or places of assemblage without fixed seats	120
Dance halls	120
Theater stage	150

School Buildings, Libraries, and Museums:—	
Classrooms and rooms for similar use	60
Corridors, laboratories, and similar public parts of the building	80
Hotels, Apartment and Tenement Houses, Clubhouses, Hospitals, and Places of Detention:—	
Private rooms and apartments	50
Public corridors, offices, lobbies, dining rooms, etc.	80
Office Buildings:—	
First floor	100
Upper floors	60
Grand stands	100
All stairs	100
Workshops, factories and mercantile establishments	100

In warehouses, workshops, factories and mercantile establishments used for the sale, storage or manufacture of heavy merchandise or machinery the floors shall be designed to carry all loads safely, including an allowance of at least 25 per cent for vibration where such occurs.

Roofs	30
Sidewalks	150

In any building where the floor load on any floor is taken as more than 150 pounds per square foot, the sidewalk load shall be taken equal to the maximum floor load.

The foregoing floor loads (but not the roof or sidewalk loads) may be decreased by 20 pounds in buildings of fireproof construction.

Note. This reduction is permitted because (1) a fireproof floor suffers little or no deterioration; (2) a fireproof floor is not weakened by a fire below; (3) the greater dead load of a fireproof floor means that any accidental overload is a small proportion of the total dead and live load.

Concentrated, partial, and eccentric loading shall also be provided for.

The joists, beams, girders, columns, and walls supporting the roof shall be designed to carry the full loads.

Floor girders and trusses over 30 feet long shall be designed to carry not less than 85 per cent of the live load besides the dead load; except that in hotels, apartment and tenement houses, hospitals, club houses, and office buildings they shall be designed to carry not less than 75 per cent of the live load besides the dead load.

In a factory, store, warehouse or similar commercial building, the live load to be supported by walls, columns and foundations, shall be assumed at not less than 85 per cent of the full live load of the top floor, 80 per cent of the next lower floor and 75 per cent for each succeeding lower floor.

In all other buildings the live loads to be supported by walls, columns, and foundations, shall be assumed at not less than 85 per cent of the full live load of the top floor and 5 per cent less for each succeeding lower floor until a ratio of 50 per cent is reached, which shall be used for all succeeding lower floors.

SECTION 2. WIND PRESSURE.

Order 5301. Every building shall be designed to resist a horizontal wind pressure of 30 pounds for every square foot of exposed surface, in addition to the dead loads and the live loads specified above.

If the overturning moment due to wind pressure exceeds 75 per cent of the moment of stability of the structure due to dead load only, the structure shall be anchored to its foundations, which shall be of sufficient weight to insure the stability of the structure; and sufficient diagonal bracing or rigid connections between uprights and horizontal members shall be provided to resist distortion.

The overturning moment may be disregarded in a structure less than 100 feet in height if the height does not exceed twice the width.

When the stress due to wind in any member is not greater than 50 per cent of the stress due to the dead and live loads, it may be neglected. When the wind stress is greater than 50 per cent of the dead and live load stresses, then the sum of all these stresses shall not exceed 150 per cent of the stresses hereinafter provided.

SECTION 3. FOUNDATIONS.

Order 5302. The permissible loads on natural earth shall not be more than the following, in tons per square foot:

Quick sand and alluvial soils	½
Soft clay	1
Ordinary clay and sand together in layers, wet and spongy	2
Clay or fine sand, firm and dry	3
Sand, compact and well cemented	4
Gravel and coarse sand, well packed	5
Hard pan or shale	6

The maximum load on a timber pile shall not exceed 500 pounds per square inch, and shall be determined by the following formula:

$$L = \frac{2WH}{S + 1/10} \text{ for steam hammer}$$

$$L = \frac{2WH}{S + 1} \text{ for drop hammer}$$

in which formula

L=safe load in pounds.
W=weight of hammer in pounds.
H=fall of hammer in feet.
S=penetration under last blow in inches, assumed to be sensible at an approximately uniform rate.

SECTION 4. MASONRY CONSTRUCTION.

Order 5303. Unit Stresses. The following unit compressive stresses (pounds per square inch) shall not be exceeded:

Kind of Mortar	Lime 1:3	Lime and Portland Cement ½:½:3	Portland Cement 1:3
Standard common brick (crushing strength 1800)	100	125	175
Hard or select brick (crushing strength 3000)	150	180	270
Rubble, well bonded	80	100	150
Hollow tile or concrete blocks (see order 5309), gross area			60
Concrete (see order 5313).			

For any other type of masonry the unit stress shall be calculated on the basis of a factor of safety of 10 or more, in accordance with standard practice.

Order 5304. Brick Bearing Walls. For all non-fireproof buildings except office buildings and buildings of the apartment house and hotel class, the outside, party, division and other bearing walls shall be not less than 12 inches thick in the upper two stories, increasing four inches in thickness for each two stories (or fraction) below, except as hereinafter provided; no such two story height shall exceed 30 feet. But the first story side walls of a three story building may be 12 inches thick if laid in Portland cement mortar and if the second floor joists are supported by wall hangers. Any wall which is not more than 50 feet long between crosswalls may be reduced to the thickness specified for fireproof buildings.

For all fireproof buildings, and for non-fireproof office buildings and buildings of the apartment house and hotel class, the outside, party, division and other bearing walls shall be not less than 12 inches thick in the upper three stories, increasing 4 inches in thickness for each 3 stories (or fraction) below, except as hereinafter provided; no such three story height shall exceed 45 feet.

A building not more than three stories in height may have 8-inch walls in the upper story, provided such story is not more than 10 feet high in the clear, and the span is not more than 20 feet, and the wall is not more than 60 feet long between cross walls, offsets or pilasters. A building not more than one story in height may have 8-inch walls provided the clear story height is not more than 12 feet, the roof span is not more than 25 feet, and distance between cross walls, offsets or pilasters is not more than 60 feet. All other one story buildings shall have all bearing walls not less than 12 inches thick.

Eight inch partition walls may be 14 feet high in the clear, but not more than 40 feet long between pilasters or cross walls. But no 8-inch wall shall serve as a party or fire wall.

Note (a). To secure proper protection against a severe fire it is recommended that division walls, and outside walls of fireproof or mill buildings, be made at least 12 inches thick of brick or plain concrete, or of reinforced concrete as described in order 5315.

Note (b). In the case of long spans or heavy floor loads, the thickness of walls must be increased if necessary so that the allowable unit stresses will not be exceeded.

Every wall shall be bonded with header courses extending through the wall at intervals no greater than every sixth course.

If any horizontal section of any bearing wall shows more than 40 per cent reduction of area on account of flues, openings or recesses, the wall shall be proportionally increased in thickness.

Order 5305. Curtain Walls. Curtain walls supported at every floor level shall be not less than 8 inches thick, provided the vertical height between beams is not more than 12 feet. For the first story the unsupported height may be not more than 18 feet provided the pilasters or columns are not more than 20 feet apart. See note (a), preceding order.

All other walls shall be not less than 12 inches thick.

Order 5306. Stone Walls. Stone walls shall be 4 inches thicker than required for brick walls and shall be similarly bonded.

Order 5307. Stone or Terra Cotta Facing. Stone facing not less than 4 inches thick, and architectural terra cotta which extends not less than 4 inches into the wall and which is filled solid with concrete or with brick and mortar, may be considered as part of the required thickness of a wall if substantially bonded to the backing as required for brickwork. No such wall shall be less than 12 inches thick.

Order 5308. Hollow Walls. In all walls that are built hollow. the same quantity of material shall be used as if they were built solid, and the parts of such hollow wall shall be connected with proper ties placed not more than 24 inches apart.

Order 5309. Hollow Building Blocks. In buildings not over three stories and not more than 45 feet high, hollow tile or concrete blocks may be used for outside walls and inside bearing walls. as well as for nonbearing partitions. Such blocks (except for nonbearing partitions) shall have an ultimate compressive strength of not less than 700 pounds per sq. in. of gross area. In computing the gross area, no deduction shall be made for hollow spaces.

Note. Hollow tile should be of shape and material especially suitable for outside walls and should have undergone tests to prove its fire and weather resisting qualities; such walls should be further protected with ¾ inch of cement plaster on the outside. Concrete blocks should be made of good coarse aggregate, with at least 15 per cent of good Portland cement. properly mixed, moulded, and cured. With fine sand more cement is necessary. Hollow tile or concrete blocks of inferior quality will often not withstand weather or fire and should not be used for outside or bearing walls.

The hollow spaces shall not exceed 55 per cent in the case of terra cotta or clay tile, or 33 per cent in the case of concrete blocks; except that in clay tile used in one-story buildings the hollow spaces shall not exceed 60 per cent. The absorption shall not exceed 12 per cent in 48 hours.

Note. A list of hollow tile which have been approved may be obtained from the Industrial Commission.

Such walls shall be laid in Portland cement mortar. The thickness of such walls shall be the same as required for brick walls, but no such wall shall be higher than 15 times its thickness.

Brick facing may be considered as part of a hollow tile or concrete block wall (or vice versa) if the two materials are properly bonded with header courses of brick not farther apart than every sixth course.

Note. This requires a size of tile which will work out properly with the brick courses. A tile 12 inches high is not suitable for bonding with brick of the usual size.

Order 5310. Parapet Walls. All exterior, division and party walls of non-fireproof buildings shall have parapet walls not less in thickness than the wall below, carried to 3 feet above the roof and capped with incombustible material; but this order shall not apply to buildings where frame construction would be permitted; nor to walls of buildings where not less than 10 feet of vacant space is maintained between the wall and the boundary line between premises.

Order 5311. Recesses. Recesses for water, sewer or other pipes shall not be deeper than one-third the thickness of the wall and the recesses around such pipes shall be filled up with solid masonry for a space of one foot at the top and bottom of each story.

Order 5312. Old Walls. Walls heretofore built as party walls but which are not in accordance with the requirements of this section may be used if in good condition provided the height of the same be not increased.

In case it is desired to increase the height of an existing party or independent wall, which is less in thickness than required under this section, the same shall be done in one of the following ways:

(1) By a lining of brick work, supported on a proper foundation, and forming a combined thickness with the old wall of not less than 4 inches more than the thickness required for a new wall; no lining shall be less than 8 inches in thickness; all lining shall be laid up in cement mortar, and thoroughly anchored to the old wall with suitable iron anchors, placed not over 2 feet apart, the old wall being first cleaned of plaster or other coating; or

(2) Such old wall may be increased in height if the new live and dead loads are uniformly distributed over the entire old wall by means of a distributing girder and if the total load does not exceed the allowable unit stresses; or

(3) The new wall may be carried by steel or concrete columns.

SECTION 5. CONCRETE CONSTRUCTION.

Order 5313. Unit Stresses and Reinforcement. The following unit stresses (pounds per square inch) shall not be exceeded.

Reinforced Concrete, 1:2:4 mix:—

Compression in concrete, extreme fiber, (assuming a straight line stress distribution)	700
Tension in concrete	none
Compression in steel—15 times the compression in concrete at the same point.	
Tension in steel	16,000
Bond between concrete and steel	80
Shear in concrete	40
Compression on net core area of concrete column, with longitudinal and transverse reinforcement each equal to at least 1 per cent of the core volume	800
Compression on net core area of a similar column but with concrete of a 1:1½:3 mix	900
Compression on net core area of a column with less reinforcement than the above	500

Plain Concrete:—

	Compression	Shear	Tension due to bending
1:2:4 mix	400	40	35
1:2½:5 mix	300	35	30
1:3:6 mix	250	30	25

Note. The foregoing are maximum stresses, suitable for concrete which will develop a crushing strength of at least 2,000 pounds per square inch in 28 days, with a 1:2:4 mix. Where fine sand (very common in Wisconsin) or soft stone is used, the stresses should be decreased or the proportion of cement increased. The following table indicates what strength may be expected with different aggregates, with good coarse sand and good workmanship:

Aggregate	1:1:2	1:1½:3	1:2:4	1:2½:5	1:3:6
Granite, trap rock	3300	2800	2200	1800	1400
Gravel, hard limestone and hard sandstone	3000	2500	2000	1600	1300
Soft sandstone and sandstone	2200	1800	1500	1200	1000
Cinders	800	700	600	500	400

Joint Committee on Concrete and Reinforced Concrete.

The minimum longitudinal reinforcement of a column or beam shall be four ½ inch round rods. The minimum transverse reinforcement of a column or beam shall be the equivalent of ¼ inch round rods, averaging not more than 12 inches apart. The steel shall be protected by at least 1½ inches of concrete for columns, 1 inch for beams, and ½ inch for slabs; but this protection shall not be less than the diameter of the rod in any case. In any column longer than 15 times its least diameter the unit stresses shall be properly decreased. The transverse reinforcement shall not be considered in calculating the strength of a column.

Every concrete structure shall be designed in accordance with this code and with the rules and principles of standard practice.

Note (a). For proper fire-resistance the protection of reinforcement is recommended to be at least ½ inch greater than required above.

Note (b). "Standard practice" is well illustrated in the final report of the Joint Committee on Concrete and Reinforced Concrete.

To quote from introduction to this report: "In their use, concrete and reinforced concrete involve the exercise of good judgment to a greater degree than do any other building materials."

Order 5314. Materials and Supervision. Only Portland cement shall be used which conforms to the Standard Specifications of the American Society for Testing Materials in force Oct. 1, 1914. (Furnished on request.)

Steel shall be used for reinforcement which shall conform to the Standard Specifications of the American Society for Testing Materials in force Oct. 1, 1914. (Furnished on request.)

The supervision required by order 5200, includes, in the case of concrete structures, a close personal supervision by an experienced superintendent or inspector of the placing of reinforcement, mixing and placing of concrete, and removal of falsework or forms. Especially close supervision is necessary when the temperature falls below 40° F.

Order 5315. Concrete Walls. Plain concrete walls of 1:3:6 mix or better, may be built of the same thickness as required for brick walls. Basement walls of 1:2½:5 mix or better, may be built 4 inches less in thickness than required for brick walls but not less than the wall above.

Concrete walls may be of less thickness than required for brick walls if properly reinforced in accordance with the preceding orders. If such a wall serves as a required division or fire wall, or as the outside wall of a building which is required to be of fireproof or mill construction, such wall shall be of 1:2½:5 mix or better, not less than 6 inches thick, and reinforced with steel weighing not less than ½ pound per sq. ft., properly distributed. Such thickness and reinforcement shall be increased where necessary in accordance with standard practice.

SECTION 6. STEEL AND IRON CONSTRUCTION.

Order 5316. The following unit stresses (pounds per square inch) shall not be exceeded:

	Rolled Steel	Cast Steel	Wrought Iron	Cast Iron
Tension on net section	16,000	16,000	12,000	—
Compression on gross section (max.). See formula below	12,000	12,000	10,000	8,000
Tension on extreme fiber	16,000	16,000	12,000	3,000
Compression on extreme fiber	16,000	16,000	12,000	10,000
Extreme fiber of pins	25,000	—	—	—
Shear:				
Pins and power-driven rivets	10,000	—	—	—
Hand-driven rivets	8,000	—	—	—
Machine bolts	7,000	—	—	—
Rolled steel shapes	12,000	—	—	—
Plate girder webs, net section	10,000	—	—	—
Brackets	—	—	—	2,000
Bearing:				
Pins and power-driven rivets	20,000			
Hand-driven rivets	16,000			
Machine bolts	14,000			
Compression:				
Steel	$17{,}100 - 57\frac{L}{R}$			
Wrought iron	$12{,}000 - 60\frac{L}{R}$			
Cast iron	$10{,}000 - 60\frac{L}{R}$			

Where L = length in inches.
R = radius of gyration in inches.

Every steel or iron structure shall be designed in accordance with this code and with the rules and principles of standard practice.

All steel or iron shall conform to the standard specifications of the American Society for Testing Materials in force Oct. 1, 1914. (Furnished on request.)

SECTION 7. WOOD CONSTRUCTION.

Order 5317. Unit Stresses. The following unit stresses (pounds per square inch) shall not be exceeded:

	Tension		Compression		Transverse	Shear
	With grain	Across grain	With grain	Across grain	Extreme fibre	With grain
White oak	1,200	125	1,100	500	1,500	150
White pine	700	50	900	200	1,000	80
Long leaf yellow pine	1,200	60	1,500	350	1,700	150
Short leaf yellow pine	1,000	50	1,100	300	1,400	100
Douglas fir	1,000	50	1,300	325	1,600	110
Norway pine	800	50	1,000	250	1,200	100
Eastern spruce and fir	800	50	800	200	1,000	80
Hemlock	600	--------	900	200	1,100	80

The stress in compression members shall not exceed $C\left\{1-\frac{L}{60D}\right\}$ where

C = "compression with grain"
L = length in inches
D = least width in inches

Note. The above are maximum stresses, suitable for timber which is free from injurious defects and of sufficient density.

Defects include decay, knots, shakes, checks, etc. Decay is dangerous because it tends to spread and because it is difficult to determine the extent to which the timber is weakened. Knots and cross grain in the center half of beams near the bottom edge are especially serious. Deep checks and ring shakes are of importance when they occur in the middle half of the height of the beam or when they run diagonally across the faces; for beams containing such checks, the allowable stress in horizontal shear should be decreased.

The density of the wood is important because the strength of timber increases with the density; this in turn is in proportion to the per cent of "summerwood" (i. e. the hard, dark part of the ring). In yellow pine and Douglas fir the summerwood should form at least 25 per cent of the total if the above stresses are to be used.

These stresses should be decreased at least 20 per cent for timber exposed to moisture.

For further details on the strength and grading of timbers, see Bulletin 108 and other publications of the U. S. Forest Service.

Order 5318. Stud Partitions. Studs in a bearing wall shall be not less than 1⅝ x 3⅝ inches, with the 3⅝ inch dimension at right angles with the plane of the wall. Wooden stud partitions and walls shall be capped with a two inch plate below the floor joists; or if the studs run through, pieces of studding shall be fitted in between so as to form a fire stop. No lath shall extend through from room to room.

For "semi-fireproof" stud partitions see order 5112.

Order 5319. Furring for Walls. When walls are furred, unless the wall between joists is built out to face of lath, there shall be a continuous horizontal strip placed close to the joists at top and bottom; and before the lathing is done, the wall shall be plastered with a coat of mortar at least 6 inches wide and of the full thickness of the strip, just above or below each horizontal strip. Wooden lath or furring shall not be used in any building of fireproof or mill construction.

Order 5320. Floor and Roof Beams. The ends of all wooden floor or roof beams or joists which rest on a masonry wall shall enter the wall to the depth of 4 inches, unless wall hangers are used, or unless the wall is properly corbeled out 4 inches, in which case the corbeling shall extend to top of joists.

Walls shall be anchored to the floor and roof construction with iron or steel wall anchors placed not more than 8 feet apart.

The ends of all such beams or joists shall be so shaped or arranged that in case of any deflection, or breaking, they may fall out without doing much injury to the brick wall. All joists entering any brick or stone wall shall be splayed approximately 3 inches shorter at top edge.

No wooden beam or other timber shall be built into a party wall nearer than 2 inches to the center of the wall.

Part V

FACTORIES, OFFICE AND MERCANTILE BUILDINGS

The requirements of the following sections apply to buildings of this classification only.

For other general requirements see Parts I to IV.

SECTION 1. CLASSIFICATION.

Order 5400. This classification includes all factories and workshops (including all places where manual labor is employed), office buildings, telegraph and telephone offices, mercantile establishments where commodities are bought or sold, warehouses, railroad stations, exhibition buildings, and places where less than 100 persons assemble for entertainment, worship, or dining purposes.

SECTION 2. EXITS.

Order 5401. Number and Location. Every building and every story thereof shall have at least two exits, with the following exceptions:

(1) First and second story storage rooms not over 3,000 square feet in area:

(2) The second story of a two story building, provided such story is used only for offices; is not over 3,000 square feet in area; and has a stairway enclosed with fireproof or semi-fireproof partitions, leading directly to the outside and not leading to the basement.

Additional exits shall be provided, if necessary, so that no part of the building will be more than 75 feet distant from an exit, measuring along public passageways and aisles; but such distance may be increased to 100 feet in the following buildings, provided no hazardous condition exists therein:

(1) Fireproof buildings whose contents are entirely or almost entirely incombustible;

(2) Fireproof office buildings;

(3) Fireproof storage warehouses with fireproof individual compartments;

(4) Buildings having an approved automatic sprinkler system, provided the contents are not especially inflammable.

Exits shall be so located as to afford the best possible egress.

Order 5402. Type of Exits. At least one-half of the exits above required shall be stairways (see orders 5117-5119). The other exits shall be either stairways, or horizontal exits (order 5120), or fire escapes (orders 5121-5131). But no fire escape shall be accepted as an exit from any floor which is more than 60 feet above the grade at the point where such fire escape is located, except that such height may be increased to 90 feet in the case of fireproof office buildings or fireproof buildings where such floors are used for storage only. In a two story building, an outside wooden stairway may be used as an exit.

Every building which accommodates more than 50 persons above the second floor shall have at least two exits other than fire escapes, excepting fireproof office buildings and other fireproof buildings whose contents are entirely or almost entirely incombustible, provided such building does not exceed 7,000 square feet in floor area at the third floor.

Order 5403. Enclosure of Stairways. In all buildings having a greater number of stories than the number given in the following table, all stairways shall be enclosed as specified in orders 5115 and 5116:

	Non-fireproof, not sprinklered	Either fireproof or sprinklered	Fireproof and sprinklered
Office buildings; other buildings whose contents are practically incombustible	3	4	5
All other factories, stores, and other business buildings	2	3	4

Exceptions. (1) A three story mercantile building having at least two stairways may have one stairway unenclosed provided such stairway does not lead to the basement.

(2) A fireproof building having at least two stairways may have one stairway unenclosed from the first to the third (or second) floor, provided such stairway is enclosed in the third (or second) story and does not lead to the basement.

(3) Stairways must be enclosed in all buildings of more than two stories where inflammable material or any other especially hazardous condition is present.

A fire escape shall be provided on every building of more than two stories which does not have at least two enclosed stairways, or one enclosed stairway and a horizontal exit.

One enclosed stairway may serve as an exit for two divisions of a building if each division has a door opening directly into the stairway enclosure; provided each division shall have at least two means of reaching the ground, either directly or indirectly.

Order 5404. Total Width. In a building not provided with horizontal exits, the total width of stairways shall be not less than the following:

In ordinary or frame buildings, 60 inches per 100 persons; if sprinklered, 40 inches per 100 persons.

In fireproof and mill buildings:

	Fire-proof Sprinklered	Fire-proof not Sprinklered	Mill Sprinklered	Mill not Sprinklered	
--------	30	50	40	60	in. per 100 persons on 2nd floor
plus ---	15	25	20	30	" " 3rd "
plus ---	12	20	16	24	" " 4th "
plus ---	9	15	12	18	" " 5th "
plus ---	6	10	8	12	" " 6th "
plus ---	3	5	4	6	" " 7th "
plus ---	0	0	0	0	" " 8th and above
		but in no case shall such total width be less than			
	30	50	40	60	in. per 100 persons on any one floor

Standard fire escapes (orders 5121-5131) may be substituted for stairways to the extent of not more than one-third of the required total width, subject to the provisions of order 5402.

If horizontal exits (order 5120), are provided for any floor, the number of persons accommodated on such floor may be increased at the rate of 100 persons for each 40 inches width of such exits, provided such increase shall not exceed 100 per cent of the number of persons accommodated by the stairways.

Example. As examples of calculations under this order where the same number of persons are to be accommodated on each floor, the following table shows the number accommodated by two stairways of minimum width (each 44 inches wide):

Frame and ordinary buildings, 147 persons total, above first story; if sprinklered, 220 persons.

Fireproof and mill buildings:

Height of building	Fireproof Sprinklered	Fireproof not Sprinklered	Mill Sprinklered	Mill not Sprinklered	
2 stories	293	175	220	147	Persons on each floor
3 "	195	117	147	98	" "
4 "	154	92	116	77	" "
5 "	133	80	100	67	" "
6 "	122	73	92	61	" "
More than 6 stories	117	70	----------	----------	" "

Where one minimum stairway and one "A" fire escape are provided, take ¾ of the above numbers; subject to the limitations of order 5402.

See the Note on Exits, p. 22.

Order 5405. Capacity of Buildings. In calculating the aggregate width of exits, the capacity of building shall be established as follows:

In wholesale mercantile establishments and warehouses, by the number of persons employed therein plus an equal number of customers.

In dining rooms, cafes, and lunch rooms, by allowing 15 square feet of floor per person. If the room accommodates more than 100 persons see order 5501.

In retail mercantile establishments and exhibition halls, the capacity shall be determined by the architect or owner and no greater number of persons shall be permitted therein; but such number shall in no case be less than one person per 60 square feet of gross floor area excluding elevators and stairways.

In all other buildings, the capacity shall be determined by the actual number of persons liable to be engaged therein and no greater number of persons shall be permitted therein. See order 5415.

Order 5406. Exit Doors. Every door which serves as an exit from a room accommodating more than ten persons (as well as doors which are exits from public passageways or stairways) shall be a standard exit door as defined in order 5132 except that such exit door need not swing outward if it accommodates less than 25 persons and is not located at the foot of a stairway, and is not more than four risers above the outside grade. Over every emergency exit door, and over every exit door where other doors or openings may cause confusion, a sign shall be placed bearing the word "Exit" or "Out" in plain letters at least 5 inches high. For red lights see order 5132.

Order 5407. Passageways. Every public passageway or aisle leading to or from a stairway, fire escape, or exit door, shall conform in width to the rule for width of stairways (order 5404). The required width shall be kept clear and unobstructed at all times. Where loose chairs or seats would be liable to cause confusion or obstruction, such chairs or seats must be fastened.

SECTION 3. SCUTTLE.

Order 5408. Every building or section of a building two stories or more in height shall have a permanent means of access to the roof from the inside. The opening shall be not less than 20 by 30 inches and there shall be a permanent ladder or stairway leading thereto.

NOTE ON ELEVATORS AND ELEVATOR ENCLOSURES.

See elevator code issued by Industrial Commission.

SECTION 4. TRAP DOORS AND FLOOR OPENINGS.

Order 5409. Every opening through any floor shall be guarded by a substantial enclosure or rail at least 3 feet high. Floor openings in buildings of more than two stories, unless enclosed with standard fireproof enclosures, shall be protected by standard fire doors, except that two stories may be connected by openings without fire doors if their combined floor area does not exceed the permissible floor area according to order 5202.

SECTION 5. LIGHTING.

Order 5410. All passageways and stairways when used at night shall have lights at the head and foot of each flight of stairs, and at the intersections of all corridors and passageways. Where "B" fire escapes are required, such fire escapes shall be lighted whenever the stairways are required to be lighted. For red exit lights see order 5132.

All gas jets or gas lights in factories or workshops where combustible material is used, shall be properly enclosed by globes or wire cages, or otherwise properly guarded. See also orders 5224-5225.

Note. For further requirements on lighting see Industrial Lighting Code for Factories, Mills, Offices, and other Work Places issued by the Industrial Commission.

SECTION 6. TOILET ROOMS, LAVATORIES AND DRESSING ROOMS.

Note. The following orders 2203, 2213, 2214, 2215, 2217 and 2218 are taken from the General Orders on Sanitation issued by the Industrial Commission. For further requirements on ventilation and sanitation see that publication.

Order 2203. Number of Closets and Urinals. In every place of employment, whether heretofore or hereafter constructed, one water-closet shall be provided for every 20 persons, or fraction thereof, of either sex.

In addition thereto, where more than 10 males are employed, one urinal shall be provided for every 40 males, or fraction. Where not more than 10 males are employed, either a urinal shall be provided or the water-closet shall have a projecting lip and self-rising seat. Where trough urinals are used, each two feet of trough shall constitute one urinal.

Also see orders 5250 to 5265, inclusive.

Order 2213. Toilet Room, Lavatories. Adequate washing facilities shall be provided in or near every toilet room. In new installations there shall be at least one lavatory for every five fixtures (closets and urinals) or fraction.

Note. One lavatory for every two or three fixtures is recommended.

Order 2214. Shop Lavatories. Adequate washing facilities shall be provided (1) in all industries where lead, arsenic, or other poisonous or injurious materials are handled by the employes, and (2) in industries where food is prepared or manufactured, and (3) in glue factories, foundries, machine shops and other industries where the employes' hands become dirty or greasy, except that in industries of the last mentioned class, located in small towns, where the employes go home at noon, this requirement may be waived by the Industrial Commission. In new installations there shall be at least one lavatory for every ten employes, or fraction, and hot water shall be provided. Basins or troughs for common use are prohibited.

Notes. (1) Washing facilities where the employe must necessarily wash in running water, are recommended. A large trough without stopper, where each person washes in running water from an individual faucet, is generally better than separate bowls.
(2) One lavatory or faucet for every five employes, is recommended.
(3) Adequate washing facilities are recommended for all industries.
(4) Wash rooms should be constructed according to the requirements for toilet rooms, as far as possible.

Order 2215. All lavatories must be made of porcelain, enameled iron, or other impervious material.

Order 2217. Drinking Water. Each place of employment must be supplied with sufficient pure drinking water and the faucets or outlets for same must be placed convenient to the employes. Common drinking cups are prohibited. Sanitary drinking fountains must be installed or individual cups must be provided by the employer.

Order 2218. Dressing Rooms. Dressing rooms shall be provided where women are employed in factories, stores, laundries, restaurants, and telephone, telegraph, express and railroad offices. Every dressing room shall be properly lighted, ventilated, and heated.

SECTION 7. STANDPIPES, FIRE EXTINGUISHERS AND SPRINKLERS.

Order 5411. Standpipes and Extinguishers. For exterior standpipes see order 5130.

Standard interior standpipes (order 5134) shall be provided in all buildings of more than two stories and more than 3,000 square feet undivided floor area, where inflammable material or any other hazardous condition is present, unless an approved automatic sprinkler system is provided. The hose shall be long enough to reach to all parts of the building, but no longer than 100 feet.

Note. The term "inflammable" is applied to objects which are not only combustible (i. e., can be burned) but which will burn readily and rapidly.

Wherever water supply of sufficient pressure is not available, two standard fire extinguishers (order 5135) shall be provided on each floor in place of each required interior standpipe.

Order 5412. Automatic Sprinklers. A complete automatic sprinkler system (order 5136) shall be provided in every building of this classification (except office buildings not used for mercantile purposes) where more than 50 persons are employed or accommodated above the third story except as provided below.

In every such building where more than 50 persons are accommodated above the second story, an automatic sprinkler system shall be provided in the basement and sub-basements, except where there is no city water supply.

An office building in which one or more of the lower floors is used for mercantile purposes, shall be classed as a mercantile building, except that no sprinklers will be required in such portions of the building as are used for offices only.

No sprinklers will be required in a building of fireproof construction whose contents are not readily combustible.

See also notes following order 5136.

SECTION 8. FIRE ALARM.

Order 5413. An approved fire alarm system shall be provided in every factory or workshop where more than 10 persons are employed above the second story, except buildings which are provided with a complete automatic sprinkler system, and except fireproof buildings whose contents are practically incombustible.

SECTION 9. NOTICE OF LOADS AND PERSONS ACCOMMODATED.

Order 5414. Floor Loads. In every factory, workshop, warehouse, or other building where material is piled, notices of a permanent character shall be painted or otherwise prominently displayed, stating the live load (pounds per square foot) which the floor is designed to carry. Such notices shall be placed in full view, on each floor.

Note. In many cases, where floors are used for the storage of some particular material, additional safety may be secured by marking on the wall the height to which the material may be piled without exceeding the safe load.

Order 5415. Number of Persons. In all buildings of this classification where 50 or more persons are accommodated on any floor above the second, notices shall be prominently displayed stating the maximum number of persons on each floor for whom stairways and other exits have been provided according to orders 5401-5405. Such notices shall be placed in full view, on each floor.

Part VI

THEATERS AND ASSEMBLY HALLS

The requirements of the following sections apply to buildings of this classification only.
For other general requirements, see Parts I to IV.
For assembly halls in schools, see also order 5614.

SECTION 1. CLASSIFICATION.

Order 5500. Theaters. This classification includes all buildings or parts of buildings used for theatrical, operatic, or motion picture performances of a public nature, except as provided in the following order.

Order 5501. Assembly Halls. This classification includes all buildings or parts of buildings not included under "theaters," where 100 or more persons assemble for entertainment, instruction, worship or dining purposes.

A private assembly hall is one built in connection with a school, club, church, or society building, and used only for private gatherings, and not rented for public use. Every other assembly hall is a public assembly hall.

Occasional private motion picture performances may be given in a private assembly hall, but in all such cases a fireproof booth must be provided according to orders 5538-5546.

Occasional private theatrical or operatic performances may be given in a private assembly hall; but in all such cases the stage must be protected as in orders 5519—26, 5533—34.

Occasional motion picture or theatrical performances (not over twice a week) may be given in a public assembly hall which is located on the first floor, accommodates not over 300 persons, and is situated in a community of not over 500 population having no regular theater; in all such cases a fireproof booth must be provided and the stage must be protected as in orders 5519–5526, 5533, 5534, 5538–5546. No place of assemblage shall be located over any such assembly hall.

SECTION 2. HEIGHT AND CLASS OF CONSTRUCTION.

Order 5502. Theaters. The main entrance or entrances shall not be at a higher level than 3 steps of 6 inches each, above the sidewalk at that point. The floor level at the highest row of seats, on the main floor, shall not be more than 6 feet above the sidewalk level at the main entrance; and the floor level at the lowest row of seats, on said floor, shall not be more than 6 feet below the level of the adjoining sidewalk.

But this requirement shall not apply to a "general purpose building" or village hall, in which the first story is used for village offices, fire department, etc., the second story is used as an assembly hall and also for motion picture performances; provided

(1) The building shall not be nearer than 10 feet to any other building or lot line;

(2) Not more than 400 persons shall be accommodated in the hall or theater;

(3) The width of exits shall be 20 per cent greater than hereafter provided, (i. e., at least 48 inches per 100 persons);

(4) The stairways shall lead directly to the street and shall be enclosed with fireproof or semi-fireproof partitions (orders 5109-5112).

Theaters which accommodate not more than 500 persons shall be of ordinary construction or better.

Theaters which accommodate more than 500 persons shall be of fireproof construction; except the stage floor, which shall be of fireproof or mill construction (steel beams need not be fireproofed); and except the roof, which may be of wood but must have an incombustible roof covering. If the theater accommodates more than 1,000 persons, the roof shall be incombustible throughout.

Balconies and galleries which accommodate more than 100 persons shall be of fireproof construction.

Order 5503. Assembly Halls. Assembly halls which accommodate more than 1,000 persons shall be of fireproof construction. Balconies and galleries which accommodate more than 150 persons shall be of fireproof construction. Assembly halls which accommodate not more than 1,000 persons shall be of ordinary construction or better, except as follows:

Assembly halls accommodating not more than 750 persons may be built of frame construction provided the following conditions are complied with:

(1) The entire building shall not be more than one story high nor more than 6,000 square feet in area.

(2) The foundation walls and piers shall be of incombustible construction.

(3) The building shall be at least 10 feet away from any other building or adjoining lot line.

(4) The balcony shall not accommodate more than 100 persons and the balcony stairway shall lead directly to an outside door.

Every assembly hall accommodating more than 750 persons shall have the highest point of the main auditorium floor not more than 8 feet above, and in no case below, the grade line at the main entrance; except that in a building of fireproof construction, the highest point of such auditorium floor shall not be more than 15 feet above such grade.

An assembly hall accommodating not more than 750 persons and with not more than one balcony, may be placed in the second story of a building of fireproof construction provided the highest point of the main auditorium floor is not more than 22 feet above the grade at the main entrance of the building.

An assembly hall accommodating not more than 400 persons and with not more than one balcony, may be placed in the third story of a building of fireproof construction, provided the highest point of the main auditorium floor is not more than 35 feet above the grade at the main entrance to the building.

In a building which accommodates not more than 1,000 persons the ceiling and the roof may be of combustible material.

An assembly hall accommodating not more than 400 persons and with no balcony may be placed on the second floor of a building of ordinary or mill construction, provided the highest point of the floor is not more than 22 feet above the grade at the main entrance of the building.

An assembly hall accommodating not more than 200 persons and with no balcony, may be placed in the third story of a building of ordinary or mill construction, provided the floor level is not more than 35 feet above the grade at the main entrance of the building; or may be placed in any story of a building of fireproof construction. See also order 5615.

In the case of a private assembly hall, each of the above numbers of persons may be increased 25 per cent.

SECTION 3. EXPOSURE AND COURTS.

Order 5504. The wall containing the main entrance to any theater or public assembly hall shall abut on a street. The lobby or passageway leading from the main entrance to the main auditorium door shall not be longer than 50 feet nor longer than three times its width, unless it is enclosed with unpierced fireproof ceiling and floor and with an unpierced standard fire wall on each side, but if the theater or assembly hall accommodates not more than 500 persons, such passageway shall be enclosed with unpierced fireproof or semi-fireproof ceiling, floor and partitions.

Every theater or public assembly hall which accommodates more than 300 persons shall have at least three walls abutting on streets, alleys, or open courts, except as follows:

(1) If the building is not more than 100 feet long, and each aisle leads directly to an exit at the rear, then no side court will be required.

(2) If the building is not more than 40 feet wide, and

there is a cross aisle leading to a side exit at intervals no greater than every fifteenth row, then only one side court will be required.

(3) If the first floor is fireproof and not more than 500 persons are accommodated, then only one side or rear court will be required.

The width of every exit court shall be at least 6 feet if the total seating capacity is not over 500 persons, and shall be increased at the rate of one foot per 500 persons additional. Every such court shall lead to a public thoroughfare, either directly, or through a passageway of equal width, not less than 8 feet high, and having unpierced standard fire walls, and fireproof ceiling and floor designed for a live load of at least 150 pounds per square foot. No such court or passageway shall be used for storage or any other purpose whatsoever, except for egress and ingress.

SECTION 4. BUILDINGS USED FOR OTHER PURPOSES.

Order 5505. No sleeping room or apartment shall be placed over a theater which has a stage unless the entire building is of fireproof construction.

No assembly hall shall be placed over a garage, unless separated therefrom by an unpierced fireproof floor.

Every theater or assembly hall built in connection with or as a part of a building used for other purposes, shall be separated from such other parts of the building by standard fire walls, except in the following cases:

(1) fireproof private assembly halls.

(2) non-fireproof private assembly halls accommodating not more than 400 persons.

(3) halls in fireproof hotels accommodating not more than 400 persons.

(4) in non-fireproof buildings, standard fireproof partitions (order 5109) may be used instead of fire walls.

SECTION 5. CAPACITY.

Order 5506. The capacity of a theater or assembly hall shall be established by the actual number of permanently fixed seats, plus an allowance of one person for every 3 square feet where "standing room" is provided. Such "standing room" shall not include any aisle, passageway, or lobby. Where permanently fixed seats are not provided, the capacity shall be established by allowing 15 square feet of clear floor space per person in halls used as dining or dance halls only, or 6 square feet per person in all other halls. See order 5513.

No greater number of persons than the number thus established shall be permitted in any theater or assembly hall.

SECTION 6. EXITS.

Order 5507. Number and Location. Every theater and assembly hall shall have two or more exits, placed as far apart as practicable, and so located that if any exit is blocked, some other exit will still be accessible from every part. Theater exits shall be distributed on all open sides of the building. (See orders 5504 and 5512.)

This order shall apply separately to the main floor and to each balcony or gallery which seats more than 50 persons, if in a theater; or more than 100 persons, if in a non-fireproof assembly hall; or more than 150 persons, if in a fireproof assembly hall; also to the stage, dressing room section, and other employe's room.

Order 5508. Type of Exits. Exits from the first floor shall be standard exit doors with incline or steps to grade; if the doorsill is below grade, an incline shall be used, except that a private assembly hall may have a stairway exit, from subgrade, of not more than ten risers in all. No part of any incline shall have a rise of more than one foot in five. Exits from upper floors, balconies, and galleries shall be stairways (orders 5117-5119), horizontal exits (order 5120), fire escapes or inclines .

Order 5509. Stairways. Every stairway in a theater, public assembly hall, or non-fireproof private assembly hall, except stairways from the main floor to the first balcony, shall be enclosed as in orders 5115 or 5116. No storage closet shall be placed under any stairway.

Stairways and steps which have more than three risers shall have handrails on both sides. See order 5118.

Every stairway used by the public in a theater or public assembly hall, shall have a uniform rise of not more than 7½ inches and a uniform tread of not less than 10 inches, measuring from tread to tread and from riser to riser; no winders shall be used; there shall not be less than three nor more than sixteen risers in any run. For other stairs see order 5119.

Order 5510. Fire Escapes. All fire escapes shall be "B" fire escapes (orders 5121-5131) except that "A" fire escapes may be used for balconies which accommodate not more than 100 persons.

Note. Fire escape stairways with solid platforms and treads, and covered by a roof, are recommended. Such stairways may be used as regular exits, thus adding to the comfort of the audience and also decreasing the danger of panic.

Order 5511. Exit Doors. Every required exit door (whether usual or emergency) shall be a standard exit door (order 5132).

No single door or leaf to a double door, shall be more than 4 feet wide. No two doors shall be hinged together.

No rolling, sliding or revolving door shall be counted as an exit from any theater or assembly hall, nor shall any such door be permitted in any theater where it would be liable to be used by the public as an exit.

Sills at all exits shall be level and flush with adjacent inside floors, and such floors shall extend without break in the level or gradient for a distance not less than the width of the adjacent aisle.

For exit lights and signs see order 5530—1.

Order 5512. Width of Exits. The total width of exits from every theater and assembly hall, and from every part thereof, shall be at not less than the following rates:

Theaters, non-fireproof, 40 inches per 100 persons.

Thaters, fireproof (except roof), 36 inches per 100 persons. In theaters, the width of the front entrance or entrances shall be approximately one-half of the total required width.

Assembly halls, non-fireproof, 36 inches per 100 persons.

Assembly halls, fireproof, 30 inches per 100 persons.

SECTION 7. SEATS.

Order 5513. All seats, chairs and benches shall be placed not less than 32 inches for adults, or 30 inches for minors, from back to back measured horizontally; except that folding seats of approved design, with backs not more than ½ inch thick, also fixed seats on an approximately level floor in an assembly hall, may be placed not less than 30 inches back to back, for the use of adults as well as minors. If benches without arms between seats are used, the seating capacity shall be established by allowing one sitting or seat to each 18 inches of length.

All seats, chairs and benches, except chairs in boxes or loggias, shall be securely fastened to the floor; or if the floor is level, the seats or chairs may be fastened together in groups of four or more.

Note. Loose chairs or seats must not be used unless a special permit is secured from the Industrial Commission, or from the Fire Chief acting as a deputy of the commission.
This requirement does not apply to restaurants, dining or dance halls.

There shall not be more than 12 seats in a row between aisles, nor more than 5 seats in a row which has an aisle on one side only.

No seat, bench or platform on which seats are placed shall be more than 22 inches in height of riser. No such seat bench shall be nearer the ceiling than 8 feet.

SECTION 8. AISLES AND PASSAGEWAYS.

Order 5514. Width of Aisles. Aisles having seats on both sides shall not be less than 2 feet 10 inches wide at the beginning and shall increase in width toward the exits at the rate of ¼ inch per foot of run; or the aisle may have a uniform width not less than the average width of the foregoing calculation; but no wall aisle shall be less than 3 feet wide and no other straight aisle shall be less than 3 feet 6 inches wide.

Where main aisles are longer than 40 feet, there shall be a cross aisle leading to each required side exit. Cross aisles shall not be less than 4 feet wide.

Order 5515. Passageways and Foyers. Passageways and foyers shall be of width required under order 5512, and in no case less than 5 feet wide, and shall be so designed and apportioned as to prevent congestion and confusion. Passageways and foyers which serve as means of egress (whether usual or emergency) shall be at least equal in combined width to the required width of the stairways, passageways or doors leading to them.

Order 5516. Inclines and Aisled Steps. To overcome any difference in level between courts, corridors, lobbies or passageways on the ground floor, inclines shall be employed. Inclines shall not exceed one foot of rise to five feet of run.

Steps in balcony aisles shall extend the full width of the aisle.

Order 5517. Obstruction. All aisles and passageways shall be kept free from camp stools, chairs and other obstructions, and no person except an employe shall be allowed to stand in or occupy any of the aisles, foyers or passageways during any performance or public gathering.

SECTION 9. ELEVATORS.

Order 5518. All elevators shall be enclosed with standard fireproof enclosures. (See elevator code issued by the Industrial Commission).

SECTION 10. STAGE.

Order 5519. Where required. The requirements of this section shall apply to all theater stages, except that in a motion picture theater an open platform not more than 8 feet in depth will be permitted in front of the motion picture screen, provided such screen is a stationary fireproof or semi-fireproof wall or partition, and the space behind such screen (if any) is entirely separated from the platform and auditorium by such partitions, and the platform has no curtain or scenery.

In a private assembly hall having a stage or platform which is more than six feet wider or higher than the proscenium opening, or which is equipped with movable scenery, such stage shall be protected as required by this section. (See order 5501.)

Order 5520. Proscenium Wall. The proscenium wall shall completely separate the stage from the auditorium, and shall be of brick, monolithic concrete, or other approved material, with all steelwork fireproofed, except as follows:

> In a private assembly hall, a fireproof partition (order 5109) may be used.
>
> In any theater or hall which accommodates not more than 400 persons, a semi-fireproof partition (order 5112) may be used.

The proscenium wall shall extend from the basement floor to the roof, except in fireproof buildings. It shall contain not more than two openings of not more than 21 square feet each (excluding the proscenium opening). Such openings shall be provided with standard fire doors, or (where a semi-fireproof partition is permitted) with wood doors lined with metal on the stage side.

Order 5521. Fireproof Curtain. The proscenium opening shall be provided with a rigid fireproof curtain or a curtain of asbestos conforming to the following specifications, or of equivalent approved construction. Detailed plans and specifications for such curtains and their operating mechanism shall be submitted to the Industrial Commission for approval, before installation.

Asbestos curtains shall be substantially woven of asbestos fiber not less than 95 per cent pure and shall weigh not less than 2½ pounds per square yard. All seams shall be lapped not less than one inch and sewed in two rows with not less than 1-16 inch pure asbestos twine. At the top and bottom of the curtain a 1½ inch (or larger) pipe shall be placed and shall be securely fastened in and covered by the curtain. The curtain shall overlap the proscenium wall not less than 12 inches at each side and at the top, and shall be guided at each side by metallic loops or rings sliding on a steel cable. No combustible paint shall be used.

For curtains of any type, the connections between curtain and wall shall be made as nearly smoke-proof as possible. Provision shall be made to prevent the curtain from leaving or binding on the guides under any conditions. No part of a curtain or any of the curtain guides shall be supported by, or fastened to any combustible material.

The hoisting apparatus for the curtain shall be designed with a factor of safety of 8 or more.

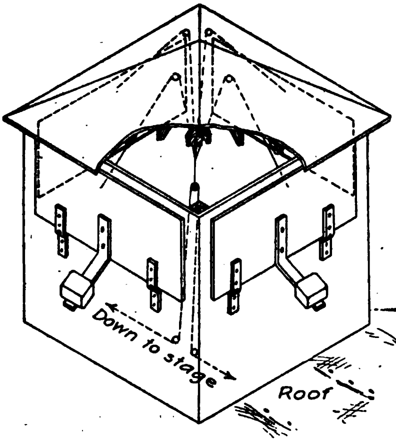
Besides the regular operating mechanism there shall be an emergency device which will allow the curtain to drop by gravity. The device shall be so arranged that it can be easily operated by hand from each side of the stage and from the fly galleries, and also that its operation will be controlled by fusible links placed on each side of the stage, and when thus operated it shall descend at its normal rate of speed.

The curtain and its operating mechanism shall be so designed and constructed at all points, whether specifically mentioned or not, as to form an efficient and reliable barrier against fire and smoke, according to the best practice.

Note. It is recommended that this curtain be raised at the commencement and lowered at the close of each performance.

Rigid steel curtains, insulated with asbestos, are recommended as giving the best protection, especially in large theaters.

Order 5522. Automatic Ventilator. The stage shall be provided with one or more automatic ventilators placed near the center and above the highest part of the stage, with the bottom of the opening at least 3 feet above the roof, and having a combined area equal to at least 8 per cent of the area of the stage floor. Vertical louvre openings shall be not less than twice the sectional area of the shaft. The ventilator shall be designed and constructed so as to open by gravity, and so as to effectively overcome the effects of neglect, rust, dirt, frost, snow, heat, twisting, or warping of the frame work. The louvres or dampers in the openings shall be held closed by cotton or hemp cords running to the stage floor close to each stage door. Fusible links shall be inserted in each cord near the ventilator.



Total area of ventilator openings not less than area of shaft

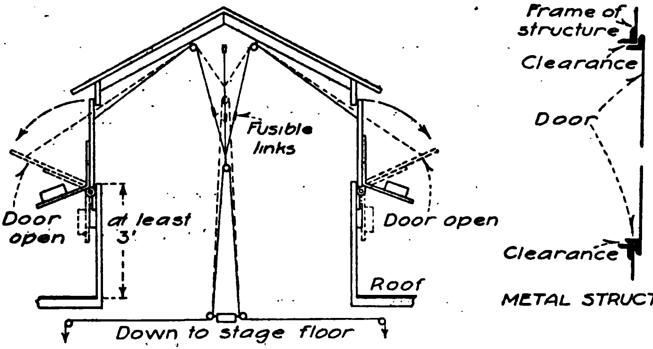
Doors held closed by cords (shown dotted)

Fusible links release doors in case of fire

. This structure may be made of wood, or of corrugated iron on metal frame (see below)

If door is made of wood, it must close against the frame, not into it, so as to prevent binding

VIEW OF WOODEN VENTILATOR



SECTION OF WOODEN VENTILATOR

METAL STRUCTURE

AUTOMATIC STAGE VENTILATOR

Order 5523. Stage Vestibules. All entrances to the stage shall be vestibuled in such manner as to protect the curtain, scenery, and auditorium from draughts of air.

Order 5524. Footlight Trough. The footlight trough shall be made of incombustible material.

Order 5525. Fireproof Paint. All stage scenery, curtains, and decorations made of combustible material, and all woodwork in or about the stage, shall be painted or saturated with some incombustible material or otherwise rendered safe against fire.

SECTION 11. DRESSING ROOMS, PROPERTY ROOMS, ETC.

Order 5526. All dressing rooms, property rooms, and other storage or workrooms shall be built of incombustible material throguhout and shall be separated from the stage by fireproof walls or partitions.

No dressing room nor employes' room shall be placed more than one story below the grade line and no dressing room shall be placed above or below the auditorium.

SECTION 12. BOILER AND FURNACE ROOMS.

Oder 5527. Every boiler or furnace room, including breaching, shall be enclosed with standard fire walls and with fireproof ceiling and floor each designed to carry a live load of at least 150 pounds per square foot; except that in the case of a private assembly hall accommodating not more than 300 persons, the floors and walls of the boiler or furnace room shall be incombustible, but fire doors and fireproof ceiling will not be required.

See also orders 5210, 5223, and the following order.

Note. If possible, the boiler or furnace room should not be located below the stage, auditorium, foyer, or exits.

SECTION 13. HEATING AND VENTILATING.

Order 5528. Every theater and assembly hall shall be provided with a ventilating system which will furnish at least

1,200 cubic feet of fresh air per hour, for each person accommodated in the auditorium, and which will also change the air at least six times per hour in all other occupied parts of the building. The fresh air shall be taken from the outside of the building and no vitiated air shall be re-heated unless it has been washed by a mechanical air washer of approved design. No floor register for heating or ventilating shall be placed in any aisle or passageway unless such register is reinforced with suitable wrought iron or steel ribs not more than 12 inches apart. Radiators in passageways or auditoriums shall be recessed, or elevated at least 7 feet above the floor.

SECTION 14. LIGHTS.

Order 5529. Oil and Gas. (See also order 5224.) No oil lamp shall be used in or about any stage containing scenery.

No gas lighting of any kind shall be used on any stage containing scenery, nor in any property room, storage room, scene dock, or fly gallery, except in localities where electricity is not available. Gas fire used for heating water, etc., shall be enclosed in iron jackets.

Note. For theaters where outside electric current is not available, a private electric plant is strongly recommended.

Order 5530. Exit Lights: Theaters. Exit lights shall be provided over all exits (both usual and emergency) and in such other places as may be necessary to direct the audience, performers, and employes to a street or alley. Such exit lights shall be either

(1) Electric lights. (See order 5225, and special requirements for theaters in National Electrical Code).

(2) Candles, or oil lamps using non-volatile oil and floating wick; such lights shall be properly shielded from drafts and from adjacent woodwork or other combustible material.

Note. If such candles or oil lights are used, the management must of course be particularly careful to see that the lights are properly maintained and lighted before every performance.

Every light over an exit (both usual and emergency) shall be provided with a red illuminated sign bearing the word "exit" or "out" in plain letters at least 5 inches high, or a similar sign shall be placed below a red light.

All public parts of the theater (except the auditorium), and all exit lights, shall remain lighted throughout every performance and until the audience has left the building.

Order 5531. Exit Lights: Assembly Halls. Every assembly hall in which the auditorium is not kept lighted throughout every performance or entertainment, shall be lighted the same as required for theaters. (Order 5530.)

In all other assembly halls, all stairways, passageways, and exit doors shall be properly lighted and shall remain lighted throughout every performance or entertainment and until the audience has left the building. Emergency exit doors shall be marked with red lights as in order 5132.

SECTION 15. TOILET ROOMS.

Order 5532. Separate toilet rooms in connection with the auditorium shall be provided for males and females. One closet shall be installed for each 200 females or fraction, and one closet and one urinal for each 300 males or fraction, assuming the audience to be equally divided between males and females; except that in dance halls there shall be provided one water-closet for each 100 females or fraction, one urinal for each 150 males or fraction and one water closet for each 300 males or fraction.

There shall be separate water-closets provided for males and females in connection with the stage of every theater which accommodates more than 500 persons, except theaters used for motion picture exhibitions only.

Separate drinking fountains shall be provided for the stage and auditorium, wherever water supply is available.

One washbowl shall be provided for every two closets or urinals, or fraction.

See orders 5250 to 5265, inclusive.

SECTION 16. FIRE PROTECTION.

Order 5533. Standpipes. For exterior standpipes see order 5130.

If proper water supply is available, one or more standard interior standpipes (order 5134) shall be provided on the stage of every theater and every private assembly hall which has a stage (see order 5519). Each hose shall be not more than 75 feet long, and where such hose will not reach all parts of the stage section (including dressing, property, storage and work rooms) additional hose connections and hose, or additional standpipes shall be provided.

Order 5534. Fire Extinguishers. Standard fire extinguishers (order 5135) shall be provided as follows:

All theaters, including motion picture theaters:

Two on stage (if more than 1,500 square feet of scenery is used).

One on stage or platform (if not more than 1,500 square feet of scenery is used).

One in motion picture booth, or in ticket office if there is no booth.

One in dressing room section.

Public assembly halls, and private assembly halls which have a stage:

One on or near stage or platform.

One in or near ticket office (if capacity of hall is more than 500 persons).

Extinguishers shall be properly exposed to view and always accessible.

Order 5535. Automatic Sprinklers. Every theater which accommodates more than 600 persons shall have approved automatic sprinklers (order 5136) on the stage, under the stage, under the fly galleries, and under the stage roof, but not in the automatic ventilator.

Order 5536. Fire Alarm. Every theater which accommodates more than 1,000 persons shall have a fire alarm box on the stage.

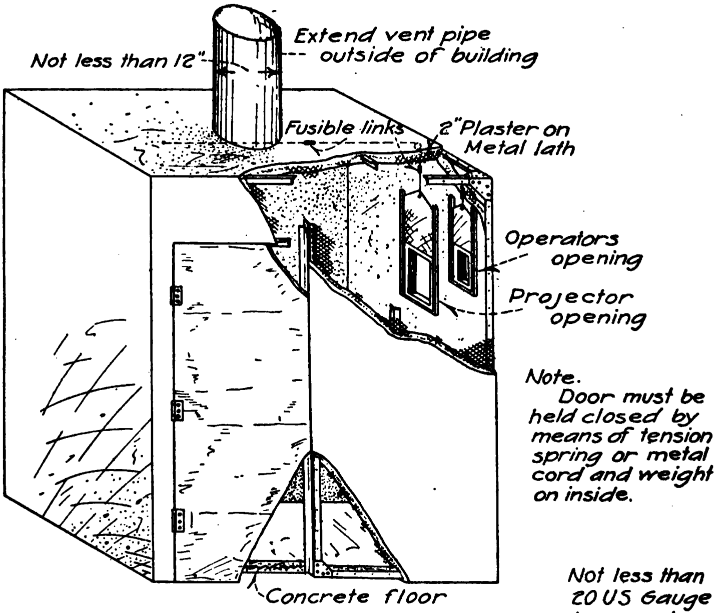
SECTION 17. MIRRORS: FALSE OPENINGS.

Order 5537. No false opening giving the appearance of a door or window, where none exists, shall be placed in any part of a theater or assembly hall used by the public.

No mirror shall be placed in any part of a theater or assembly hall used by the general public except in the women's and men's retiring and toilet rooms.

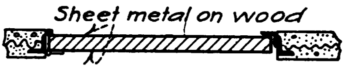
SECTION 18. MOTION PICTURE MACHINES AND BOOTHS.

Note.. This section is in accord with the specifications issued by the State Fire Marshal.

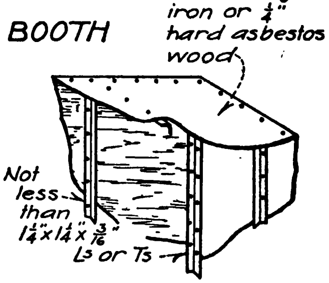


Note.
Door must be held closed by means of tension spring or metal cord and weight on inside.

METAL FRAME-PLASTER BOOTH



Horizontal section at door


Not less than 20 US Gauge iron or ¼" hard asbestos wood
Not less than 1¼"x1¼"x 3/16" Ls or Ts

Typical Construction
METAL OR ASBESTOS

MOTION PICTURE BOOTHS

Order 5538. Definition. By the term "picture machine" as used in this code is meant any device used to project upon a surface moving pictures of any character which an audience is admitted to view.

Order 5539. Construction of Booth. Every picture machine using a nitro-cellulose or other inflammable film shall, before being operated, be installed in a booth constructed entirely of fire resisting material, such as brick, tile, concrete, two inch plaster on metal lath and metal frame or of sheet iron or asbestos sheathing as specified below; provided that approved types of portable motion picture machines may be used without a booth in factories and offices where employes are assembled for instructional purposes, or in assembly halls having a floor area of not more than 1,200 square feet, where not more than two exhibitions are given each month. In every case where a booth is not used a tight metal cabinet shall be provided and used for storing metal containers of films not in use.

Note. No portable motion picture machine will be approved which does not have an incombustible housing. (Metal or asbestos board or equivalent) and which does not provide for automatically insulating or cutting off the light and heat from the film and operating mechanism when the same is not in motion for projection purposes.

The exception permitting approved portable motion picture machines to be used without booths, under the restrictions given above, is made in favor of educational exhibitions. If such machines are used without observing these restrictions, the parties responsible will be held liable for the full penalty provided by statutes. Should experience demonstrate that the restrictions are frequently violated, the exception will be repealed.

The size of the booth (for one machine) shall be not less than 5 feet by 5 feet by 6 feet high.

Note. Booth at least 6 by 6 by 7 feet are recommended.

Every booth made of sheet iron or asbestos sheathing shall have its frame constructed of not less than 1¼ x 1¼ by 3-16 inch steel angles or tees, properly braced to secure rigidity, and securely riveted or bolted at joints. The sheathing shall be not less than No. 20 U. S. gauge sheet iron or ¼ inch hard asbestos wood or lumber, securely riveted or bolted to the frame. No sheet metal booth shall be placed nearer to any combustible partition, wall, or ceiling, than 12 inches.

The floor shall be constructed of the same material as the sides and top, or of concrete. If the floor is made of sheet metal, it must be well riveted, or bolted to frame, and covered with a rubber or cork matting.

Order 5540. Door. The door shall be not larger than 2 by 5 feet, and shall either be of the same construction as the booth, or be at least ¾ inch thick and clad with metal not less than No. 28 U. S. gauge. The door shall swing outward, and close automatically, either by means of a spring on the outside or by a metal rope and weight.

Order 5541. Openings. The openings for the operator's view, or for the picture, shall not be larger than 12 inches square, and shall be provided with a gravity door, of the same construction as specified for the booth, held open by fusible links placed in series, so arranged that one of the links is suspended directly over the film when it is in the slide of the apparatus; or the door shall be so arranged as to be closed, except when held open by pressure of the operator. Such door shall not be blocked or held open in any manner except as here described.

Order 5542. Ventilation. Each booth shall be provided with a metal ventilating pipe not less than 12 inches in diameter, extending outside of the building.

Note. If a 12 inch outlet pipe is impracticable, a smaller pipe may (if approved by the Industrial Commission) be used if provided with an efficient rotary power fan.

If a standard fire window is provided not less than 4 square feet in area, connecting with the outside air, and opening not less than one-half, then the ventilating pipe may be omitted. In a private assembly hall where the picture machine is operated only occasionally and for short periods of time, the ventilating pipe may be omitted.

Order 5543. Electric Wiring. All electric wiring in the booth shall have an approved slow burning insulation. Each lamp connected with a picture machine shall be provided with a separate switch located within the booth.

Order 5544. Machine. Every machine shall be provided with feed and take-up reels in metal receiving boxes with riveted or flanged joints. A shutter shall be placed in front of the condenser, arranged so as to be closed except when held open by the operator, or by some other device that will insure the immediate dropping of the shutter when operation of the machine is stopped.

Order 5545. Films, etc. Magazines shall be used for receiving and delivering the films during the operation of the machine. Films not in the machine shall be kept in metal boxes with tight fitting covers when in the booth. No combustible substance of any sort shall be permitted in the booth, except the films used in operation. No smoking shall be permitted in any booth.

Note. It is suggested that, between pictures, a bulletin be thrown on the screen, stating the precautions taken to reduce danger of fire, and giving advice as to the dangers which might arise from panic.

Order 5546. Temporary Booths. Every temporary booth shall be of approved design, conforming as far as possible to the requirements for permanent booths. Every booth used for more than three consecutive performances in one location will be considered a permanent booth.

Part VII

SCHOOL BUILDINGS, LIBRARIES AND MUSEUMS

The requirements of the following sections apply to buildings of this classification only.
For other general requirements, see Parts I to IV.

SECTION 1. CLASSIFICATION.

Order 5600. This classification includes all public, parochial, and private schools, colleges, academies, seminaries, libraries, museums and art galleries; including all buildings or parts of buildings used for the purpose of acquiring knowledge.

SECTION 2. HEIGHT AND CLASS OF CONSTRUCTION.

Order 5601. Maximum Height. No building which accommodates primary or grammar grades, or pupils averaging 14 years old or less, shall be more than three stories high, nor shall the topmost floor level be more than 35 feet above the grade at any outside door.

No building which is used as a high school, or which accommodates pupils averaging 18 years old or less, shall be more than four stories high, nor shall the topmost floor level be more than 48 feet above the grade at any outside door.

Order 5602. Class of Construction. Every building which is more than two stories high shall be of fireproof construction, except that in a three story building ordinary construction may be used above the third floor.

Buildings not more than two stories high shall be of ordinary, mill, or fireproof construction; except that a one-story building may be of frame construction if it is not within the fire limits of any city or village.

Order 5603. First Floor Fireproof. In all two-story buildings having more than four class, study, or recitation rooms of ordinary size on any floor, the first floor shall be of fireproof construction, except that floor panels and non-bearing partitions may be of protected construction. See Orders 5100-A and 5100-B. In all other two-story buildings the basement ceiling shall be of semi-fireproof construction or better.

Order 5604. Subdivisions and Fire Stops. Every building of this classification which is built in connection with a building of a lower grade of construction, shall be separated from such other building by standard fire walls, and all communicating openings shall be protected by standard fire doors. If such openings are used as a means of egress, they shall be kept normally open during the occupancy of the building.

In primary and grammar schools, the girls' and boys' portions of the basement shall be separated by a fireproof partition in which there shall be no opening except a door for the use of the janitor, kept normally closed.

Note. This serves the double purpose of fire protection and privacy.

See order 5201.

SECTION 3. EXPOSURE AND COURTS.

Order 5605. No wall containing windows which light a school or classroom shall be less than 30 feet away from any opposite building, structure or lot line, or opposite court wall; except that the distance from such opposite court wall may be reduced to not less than 20 feet provided light rays at an angle of 45 degrees are not thereby obstructed from entering the entire upper half of any such window.

SECTION 4. EXITS.

Order 5606. Number, Location, and Type. The number and location of exits shall be such that, in case any exit or passageway is blocked at any point, some other exit will still be accessible, through public passageways, from every classroom, and from every other room used by the public or by the occupants generally.

Note. According to this requirement, every school building, however small, must have at least two exits. Furthermore, there must be an exit at the end of every corridor. Every stairway must lead to a separate exit door. But this order does not require more than one door to a classroom which accommodates not more than 100 persons.

Exception. In a high school, college, library, or museum building, one or two classrooms may be placed between the exit and the end of the corridor.

Part VII

SCHOOL BUILDINGS, LIBRARIES AND MUSEUMS

The requirements of the following sections apply to buildings of this classification only.
For other general requirements, see Parts I to IV.

SECTION 1. CLASSIFICATION.

Order 5600. This classification includes all public, parochial, and private schools, colleges, academies, seminaries, libraries, museums and art galleries; including all buildings or parts of buildings used for the purpose of acquiring knowledge.

SECTION 2. HEIGHT AND CLASS OF CONSTRUCTION.

Order 5601. Maximum Height. No building which accommodates primary or grammar grades, or pupils averaging 14 years old or less, shall be more than three stories high, nor shall the topmost floor level be more than 35 feet above the grade at any outside door.

No building which is used as a high school, or which accommodates pupils averaging 18 years old or less, shall be more than four stories high, nor shall the topmost floor level be more than 48 feet above the grade at any outside door.

Order 5602. Class of Construction. Every building which is more than two stories high shall be of fireproof construction, except that in a three story building ordinary construction may be used above the third floor.

Buildings not more than two stories high shall be of ordinary, mill, or fireproof construction; except that a one-story building may be of frame construction if it is not within the fire limits of any city or village.

Order 5603. First Floor Fireproof. In all two-story buildings having more than four class, study, or recitation rooms of ordinary size on any floor, the first floor shall be of fireproof construction, except that floor panels and non-bearing partitions may be of protected construction. See Orders 5100-A and 5100-B. In all other two-story buildings the basement ceiling shall be of semi-fireproof construction or better.

Order 5604. Subdivisions and Fire Stops. Every building of this classification which is built in connection with a building of a lower grade of construction, shall be separated from such other building by standard fire walls, and all communicating openings shall be protected by standard fire doors. If such openings are used as a means of egress, they shall be kept normally open during the occupancy of the building.

In primary and grammar schools, the girls' and boys' portions of the basement shall be separated by a fireproof partition in which there shall be no opening except a door for the use of the janitor, kept normally closed.

Note. This serves the double purpose of fire protection and privacy.

See order 5201.

SECTION 3. EXPOSURE AND COURTS.

Order 5605. No wall containing windows which light a school or classroom shall be less than 30 feet away from any opposite building, structure or lot line, or opposite court wall; except that the distance from such opposite court wall may be reduced to not less than 20 feet provided light rays at an angle of 45 degrees are not thereby obstructed from entering the entire upper half of any such window.

SECTION 4. EXITS.

Order 5606. Number, Location, and Type. The number and location of exits shall be such that, in case any exit or passageway is blocked at any point, some other exit will still be accessible, through public passageways, from every classroom, and from every other room used by the public or by the occupants generally.

Note. According to this requirement, every school building, however small, must have at least two exits. Furthermore, there must be an exit at the end of every corridor. Every stairway must lead to a separate exit door. But this order does not require more than one door to a classroom which accommodates not more than 100 persons.

Exception. In a high school, college, library, or museum building, one or two classrooms may be placed between the exit and the end of the corridor.

In a one-room building only one exit will be required. In a one-story, two-room building only one exit will be required, provided all basement partitions are of incombustible material and the boiler room door is a standard fire door.

At least one-half of the required exits, in buildings of more than one story, shall be stairways (orders 5117-5119). The remaining exits shall be either stairways, or horizontal exits (order 5120); or fire escapes may be used as exits from floors which are not more than 40 feet above grade. All fire escapes on buildings which accommodate more than 100 persons above the first floor shall be "B" fire escapes.

In every building which accommodates more than 120 persons above the first floor, there shall be at least two stairways. In buildings of more than two stories, the stairways shall be enclosed as in orders 5115-5116, unless the stairs and the corridors (including finish doors) are incombustible.

Note. In the case of stairways used by children, the rise should be less than the maximum permitted by order 5119. For primary grades, the rise should not be more than 7 inches.

Closets shall not be placed below non-fireproof stairways.

Handrails hall be provided on both sides of all exit stairs used by pupils.

Basement stairways which lead to the first floor shall be separated by standard fireproof partitions (order 5109) from all parts of the basement which are used for general storage or for the storage of inflammable material. At least one basement exit shall open directly to the outside.

Order 5607. Total Width. The total width of exits from any floor shall be not less than the following rates, based on the total number of persons accommodated on such floor and on the floors above:

Non-fireproof buildings, 40 inches per 100 persons.

Fireproof building, 30 inches per 100 persons. If the stairways are enclosed and an approved automatic sprinkler system is provided in the basement, such width may be reduced as in order 5404.

Standard fire escapes (orders 5121-5131) may be used for not to exceed one-third of the above total widths, subject to the limitations of the preceding order.

The capacity of a school building shall be established by the actual number of seats in rooms where such are used, or by the number of persons accommodated. The capacity of a library, museum, or art gallery shall be established by allowing to each person 100 square feet of the total floor area of the building, excluding stairways and elevators.

Order 5608. Exit Doors. Exit doors shall be as required in order 5132, except that they shall be not less than 2 feet 8 inches wide if used by children under 14 years. The aggregate width of exit doors shall be as required in order 5607. No single door or leaf of a double door shall be more than 4 feet wide. No revolving door shall be considered as a required exit from a building used by persons under 18 years of age.

Note. Single doors are better than double doors for school buildings.

Order 5609. Passageways. Corridors and passageways shall be so designed as to prevent congestion and confusion and shall be provided with windows and artificial light so as to be kept well lighted while building is occupied.

The minimum unobstructed width of corridors and passageways which are used by the public or by the occupants generally shall be determined the same as the width of stairways (order 5607) and shall in no case be less than 4 feet. Corridors and passageways serving as a means of egress shall be at least equal in combined width to the required width of the stairways or passageways leading to them.

SECTION 5. SCUTTLE.

Order 5610. Every building more than one story in height shall have a permanent means of access to the roof from the inside. The opening shall be not less than 20 x 30 inches and there shall be a permanent ladder or stairway leading thereto.

SECTION 6. ROOMS.

Order 5611. Floor Space and Height. The minimum floor space of school or classrooms shall be:

For primary grades, 12 square feet per person.
For grammar grades, 14 square feet per person.
All others, 16 square feet per person.

Note. These are minimum requirements. A more liberal allowance of floor space (16 to 20 square feet per person), is recommended.

All class, recitation and study rooms (not including manual training or domestic science rooms) shall be at least 12 feet high in the clear. All other rooms shall be at least 8 feet high in the clear.

Note. The following are recommended by the Department of Public Instruction:

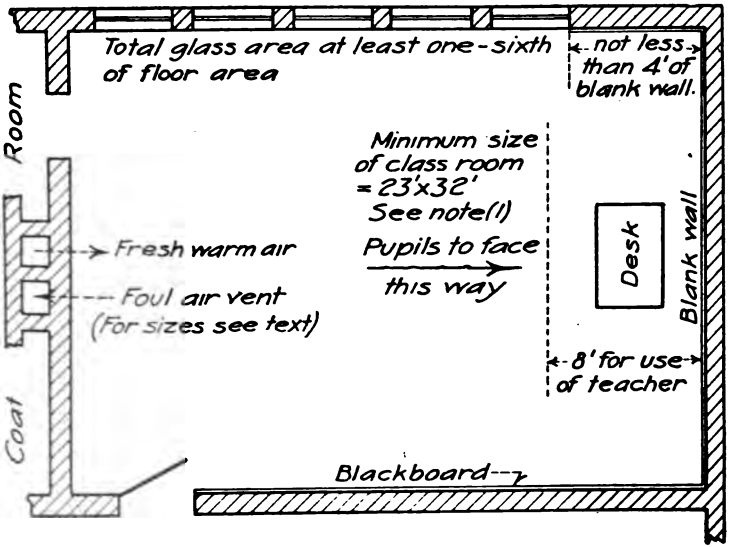
(1) Each classroom should be large enough to accommodate forty-five pupils and should be at least 23 feet wide by 32 feet long.

(2) Eight feet should be reserved at the end of the room for the use of the teacher. The corresponding wall space may conveniently be provided with a blackboard to contain programs, etc. The teachers' desk should always be placed at the end of the room and not on the long side. At the front of the room, eight feet of blank wall should be left between the front corner and the first window.

In classrooms lighted from the side only, the blank wall just mentioned may be reduced to four feet; the first window should then be provided with a shade for use on bright days. Windows should extend as close as possible to the rear corner. The ceiling height should be 12½ or 13 feet so as to give a glass ratio of at least 1:5½. This amount of glass area is especially necessary where electric current is not available.

(3) Blackboards should be from 24 inches (for primary grades) to 30 inches (for upper grades) above the floor, and from 36 to 48 inches high. Slate blackboards are best. A wide aisle should be provided next to all blackboards.

(4) Inbuilt bookcases are not generally recommended.


Total glass area at least one-sixth of floor area
not less than 4' of blank wall.
Coat Room
Minimum size of class room = 23'x32' See note(1)
Pupils to face this way
Fresh warm air
Foul air vent (For sizes see text)
Desk
Blank wall
8' for use of teacher
Blackboard

TYPICAL CLASS ROOM

Note on Windows. For window requirements see orders 2175 to 2180, inclusive, of the School Lighting Code issued by the Industrial Commission.

Order 5614. Basement Rooms. No class, recitation, or study room (not including manual training or domestic science rooms) shall have its floor more than 2 feet below the adjoining grade. Manual training and domestic science rooms, toilet rooms, and other rooms used by pupils (not including playrooms) shall have ceilings at least 4 feet above grade. The walls and floor of every basement room used by pupils or students, shall be waterproof and dampproof.

SECTION 7. ASSEMBLY HALLS.

Order 5615. A room which seats or accommodates 100 or more persons is governed by the requirements of Part VI, Theaters and Assembly Halls, except as follows:

The minimum width of any exit doorway used by children under 14 years of age may be 2 feet 8 inches (instead of 3 feet 4 inches); but in any case the aggregate width of such doorways shall be in accordance with Part VI.

Note. It is recommended that assembly halls in schools, especially when used by children under 14, be placed on the first floor so as to avoid the danger of panic.

SECTION 8. SEATS, DESKS AND AISLES.

Order 5616. Seats, chairs and desks (except those used by teachers) in class, recitation, or study rooms seating more than 50 persons shall be securely fastened to the floor; or not less than four seats (or two seats and two desks) shall be fastened together.

Class and schoolrooms shall have aisles along all walls.

In primary rooms, intermediate aisles shall be not less than 17 inches, and wall aisles not less than 2 feet 4 inches in width.

In grammar rooms, intermediate aisles shall be not less than 18 inches and wall aisles not less than 2 feet 6 inches in width.

In high school rooms and in all other class and schoolrooms, intermediate aisles shall be not less than 20 inches and wall aisles not less than 3 feet in width.

Assembly hall seats and aisle shall conform to the requirements for assembly halls (orders 5513-5517).

SECTION 9. BOILER AND FURNACE ROOM.

Order 5617. In buildings of more than one story all boiler or furnace rooms, fuel rooms and laundries shall be enclosed (together with breaching) with fireproof floor and ceiling and with incombustible walls at least 8 inches thick (or 5 inches thick if of reinforced concrete) with all openings protected by standard fire doors. Such boiler or furnace shall be separated as effectively as possible, either by distance or by partitions and doors, from all stairways leading to the first floor, and especially from stairways which lead continuously to the upper floors.

Note. Boilers and furnaces are strongly recommended to be placed in separate buildings. This will eliminate the most frequent cause of school fires.

SECTION 10. TOILET ROOMS.

Order 5618. School buildings shall have the following sanitary equipment:

One water-closet for every 20 females or fraction except for grammar and primary grades, where there shall be one water-closet for every 15 females or fraction.

One water-closet and one urinal for every 40 males or fraction, except for grammar and primary grades, where there shall be one water-closet and one urinal for every 30 males or fraction.

A drinking fountain and sink shall be installed in each story and basement, for each 6,000 square feet of floor area, or fraction. Drinking fountains shall not be installed in toilet rooms.

A proper number of washbowls shall be provided.

Note. Ordinarily there should be at least one washbowl for every two closets or urinals. Washbowls should be placed either in the toilet room or immediately outside.

See also orders 5250-5265, inclusive.

Where sewer system is not available see requirement of orders 5262 and 5263. Privies, where permitted, shall be placed at least 20 feet away from any other occupied building, and shall be constructed as specified in the Wisconsin Code for Rural School Privies issued by the State Board of Health.

For requirements governing toilets other than water flush toilets, consult the rules of the State Board of Health relating to the sanitary care of schools.

SECTION 11. VENTILATION.

Order 5619. All parts of the building generally used by the public or the occupants, except the corridors, passageways and stairways, shall be provided with fresh air at the rate of at least 1,200 cubic feet per person per hour. The fresh air shall be taken from the outside of the building and no vitiated air shall be reheated unless washed by a mechanical air washer of approved design; in such case not less than one-third of the required air shall be taken from the outside.

Where no fan is provided, the area of heat flues for classrooms shall be at least 1-200 of the floor area and the area of the cold air inlet, also of vent flues, shall be at least 1-250 of the floor area. It no fan is provided and steam heat is used, there shall be at least 160 square feet of radiating surface at the base of the fresh air flue for each room which will accommodate 40 pupils, and corresponding amounts for larger or smaller rooms. Every heating plant shall include adequate provisions for humidifying the air.

Notes. (1) Foul air outlets should be placed in the wall flush with the floor, and not provided with gratings. Fresh air inlets should be 7½ or 8 feet above the floor. Floor registers are not recommended; registers for warming the feet may be placed in the baseboard. Fresh air should be taken from the outside through a fresh air room and not admitted directly from the outside. For heating the building while unoccupied, a return flue may be provided with wing register in the wall (not the floor).

(2) In gravity heating and ventilating systems the vent flue should not open into the attic but should be carried through the roof. Where fan is used the flues may open into the attic provided the attic has a tight floor and sufficient ventilation through roof is provided.

(3) The heating and ventilating system should be considered as a part of the general design, and should be laid out by, or in collaboration with, the architect. The contract for such system should not be let until the general design has been worked out. It is often desirable to require a test of the system in cold weather, meanwhile withholding 25 per cent of the contract price or requiring an equivalent bond.

SECTION 12. LIGHTING.

Order 5620. Artificial Lighting. Each classroom of standard size (32 feet long by 23 feet wide) shall be equipped with at least four artificial lighting units symmetrically spaced.

Where electric service is available at least one circuit of

660 watts capacity (see 1918 National Electrical Code) shall be supplied to each standard classroom.

See orders 2181 to 2189 inclusive of the School Lighting Code issued by the Industrial Commission.

SECTION 13. STANDPIPES AND FIRE EXTINGUISHERS.

Order 5621. For standard exterior standpipes see order 5130.

In every building which is more than one story high and which is not provided with interior standpipes, standard chemical fire extinguishers (order 5135) shall be provided in the proportion of one extinguisher to each 3,000 square feet of floor area or fraction in non-fireproof buildings, or one to each 8,000 square feet of floor area or fraction in fireproof buildings; but there shall be at least one fire extinguisher on each floor including basement. All fire extinguishers shall be prominently exposed to view and always accessible.

Note. Automatic sprinklers (order 5136) are recommended for all parts of the basement where combustible material is liable to be stored.

SECTION 14. FIRE ALARMS.

Order 5622. Every building two stories or more in height shall be provided with a proper alarm or gongs which can be operated from any story, including basement, and can be heard throughout the building. Such alarm system shall be tested at least once a week.

NOTE ON MOTION PICTURE STAGES AND BOOTHS.

For motion picture booths and stages in schools see order 5501.

Part VIII

APARTMENT HOUSES, HOTELS AND PLACES OF DETENTION

The following requirements apply to buildings of this classification only.

For other general requirements see Parts I to IV. For rooms which accommodate more than 100 persons, see Part VI, Theaters and Assembly Halls.

Note. This code in no way affects the validity of sections 1636—180 to 1636—201 of the statutes, known as the Tenement House Law for cities of the first class (i. e., Milwaukee). On all points where the requirements of the Tenement House Law are more stringent than the requirements of this code, the Tenement House Law must be complied with for buildings in Milwaukee. All requirements of this code which are not covered in the Tenement House Law will apply in Milwaukee the same as elsewhere.

SECTION 1. CLASSIFICATION.

Order 5700. Apartment (Tenement) Houses. This classification includes every building or part of a building occupied as the residence of three or more families living independently, or occupied by two such families and also used for business purposes.

Order 5701. Hotels and Places of Detention. This classification includes all hotels, lodging and boarding houses, clubhouses, dormitories, convents, hospitals, asylums, jails and other places of detention, including every building or part of a building used for sleeping or lodging purposes by three or more persons not members of a family, provided that where the number of such persons is less than six, the following orders shall not apply: 5703 to 5716, inclusive, 5720, 5726 to 5729, inclusive.

Note. Where the following requirements refer to "families" or "apartments," the requirement applies to apartment houses; where they refer to "persons" or "rooms," the requirement applies to hotels and places of detention.

SECTION 2. HEIGHT AND CLASS OF CONSTRUCTION AND FIRE STOPS.

Order 5702. Fireproof Construction. Buildings of four or more stories shall be of fireproof construction, except that hotels and apartment houses not more than 4 stories in height may have floor panels and non-bearing partitions of protected construction. See Orders 5100-A and 5100-B.

All places of detention where persons are confined by locked doors or barred windows, shall be of fireproof construction.

Hospitals of three or more stories shall be of fireproof construction; except that hospitals not more than three stories in height may have floor panels and non-bearing partitions of protected construction. See orders 5100-A and 5100-B.

Order 5703. Ordinary Construction. All three story buildings of this classification shall be of fireproof, mill, or ordinary construction, except that a three story apartment house which accommodates only one family on each floor may be of frame construction if not within the fire limits of any municipality.

Order 5704. First Floor Fireproof. In three story buildings, the first floor and all members supporting the same shall be of fireproof construction; except that in a three story building which accommodates not more than four families or 30 persons above the first story, the basement ceiling shall be either fireproof or semi-fireproof (order 5113); in such cases the spaces betwen floor joists, below or above stud partitions, shall be fire-stopped with incombustible material extending the full height of the joists and the full thickness of the partition.

Order 5705. First Floor Used for Business Purposes. In all buildings whose first story is used for a garage, the first story ceiling shall be of fireproof construction; except that in buildings not more than three stories in height floor panels may be of protected construction. See Order 5100-A.

In a building more than two stories high whose first story is used for business purposes, the ceiling shall be either fire-proof or semi-fireproof (order 5113).

Order 5706. Room Containing Inflammable Material. Every room or apartment which is used for a carpenter or paint shop, or other equally inflammable material, shall be enclosed with fireproof ceiling and floor and with incombustible walls at least 8 inches thick (or 5 inches thick if of reinforced concrete) with all openings protected by standard fire doors.

Order 5707. Corridor and Dividing Partitions. In every building which is more than two stories high and which has more than one apartment or eight rooms on any floor, the public passageways shall be enclosed with fireproof or semi-fireproof partitions (orders 5109, 5112); if there is more than one apartment on any floor, such apartments shall be separated by such partitions; if there are more than eight rooms on any floor, they shall be divided by such partitions into groups of not more than eight rooms each.

Note. Doors in semi-fireproof corridor partitions need not be self-closing, nor of thickness required by order 5112, but should be properly constructed, fitted and hung.

SECTION 3. YARDS.

Order 5708. Behind every apartment house, the rear of which does not abut on an alley or street, there shall be a yard across the entire width of the lot, open and unobstructed from the ground to the sky. The width of the yard behind a two story building shall be either.

(1) At least 5 feet of unobstructed width; or

(2) At least 10 feet from the rear lot line to the building line, of which at least 3 feet shall be unobstructed, and the remainder may be occupied by an open (or screened) porch.

For apartment houses of more than two stories, the unobstructed width of the entire yard shall be increased one foot for each additional story, except in the case of corner lots.

No apartment house shall be placed behind any other building. Every apartment house shall abut on a street and the front wall shall be at least 25 feet from the center of the street.

SECTION 4. COURTS AND SHAFTS.

Order 5709. All courts and shafts for light, air, or dumbwaiter, shall be completely enclosed with fireproof or semi-fireproof partitions or walls (orders 5109, 5112) except as provided below.

In the case of semi-fireproof partition enclosing a court or shaft in a building of not more than three stories, the fire-resisting material will only be required on the side of the partition toward the court or shaft.

In a fireproof building, an open well piercing the second (mezzanine) floor only, will be permitted. The mezzanine floor will be considered as a full story.

Walls of outer courts and lot line courts shall be constructed the same as required for outside walls.

For elevator shafts see elevator code.

For minimum size, etc., of courts and shafts see orders 5203-5206, inclusive.

SECTION 5. EXITS.

Order 5710. Number, Location, Type. There shall be at least two exits accessible from each room or apartment, and such exits shall be at least 30 feet apart, measuring along the shortest line but not piercing any fireproof partition or wall. The number and location of exits shall be such that in case any exit or passageway is blocked at any point, some other exit will still be accessible, through public passageways, from every room or apartment; also that the entrance to each room or apartment will be not more than 50 feet distant from an exit (measuring along public passageways) if in a non-fireproof building, or 75 feet in a fire-proof building.

Note. This evidently requires at least two exits from every building and also requires an exit at the end of every corridor.

Exception. In a fireproof building or in a two-story nonfireproof building, not more than four livable rooms or any arrangement of rooms not exceeding 500 square feet in area may be placed between an exit and the end of the corridor.

At least one-half of the required exits in buildings of more than one story, shall be stairways (orders 5117-5119). The remaining exits shall be either stairways, or horizontal exits (order 5120); or fire escapes may be used as exits from floors which are not more than 40 feet above grade. Every building which accommodates more than one family or eight persons above the second story shall have at least two stairways.

Fire escapes for hospitals and asylums shall be "B" fire escapes.

Order 5711. Stairways. In three-story buildings, all stairways shall be enclosed as in order 5115 or 5116, unless the building is either fireproof or sprinklered; except that the doors may be omitted in one stairway enclosure. In three-story buildings accommodating more than two families or 15 persons above the first story, all basement stairways shall be enclosed with fireproof enclosures.

In buildings of more than three stories, all stairways shall be so enclosed, except that in fireproof buildings one stairway may be unenclosed from the first to the third (or second) floor, provided such stairway is enclosed in the third (or second) story and does not lead to the basement.

In all buildings of more than two stories, in which the first story is used for business purposes, at least one stairway shall be enclosed in the first story with an unpierced fireproof enclosure (order 5109) and such stairway shall not connect with the basement.

In apartment houses, outside stairways may be counted as exits if covered by a roof. If more than one family is accommodated above the second story, the stringers and other supporting members of outside stairs and platforms shall be of incombustible material; the treads and flooring, if of wood, shall be at least 1⅝ inches thick. If more than two families are accommodated above the second story, the adjoining doors and windows shall be protected as in order 5121.

Note. Outside rear stairways have been found satisfactory on many apartment houses. They serve the purpose of a rear stairway and fire escape combined.

In high buildings one or more exterior enclosed stairways (order 5115) should be provided.

Order 5712. Aggregate Width. The aggregate width of exits shall be as provided in order 5404.

Note. Stairways and doors of minimum width will be found sufficient to comply with this order except in large hotels.

Order 5713. Exit Doors. Exit doors shall be as specified in order 5132; except that a door which is used by not more than six families or 40 persons, shall be not less than 3 feet wide and shall not be required to open outward.

Order 5714. Passageways.. Every public passageway leading from an exit shall be at least as wide as the required width of such exit. Every public passageway leading to an exit shall be at least 3 feet wide. The required width shall be kept clear and unobstructed at all times.

SECTION 6. LIGHTS.

Order 5715. In every building which accommodates more than 4 families or 30 persons, and in every building which accommodates transients, the public passageways and stairways and exit doors shall be illuminated from one hour after sunset to one hour before sunrise. This illumination shall include lights at all intersections of passageways, at all exits, and at the head and foot of every stairway. The lights at emergency exit doors shall be red lights and shall be accompanied by a sign bearing the words "exit" or "out," in plain letters.

See also orders 5224-5225, and 5132.

SECTION 7. SCUTTLE.

Order 5716. Every building more than one story in height which accommodates more than 4 families or 30 persons shall have a permanent means of access to the roof from the inside. The opening shall be not less than 20 x 30 inches and there shall be a permanent ladder or stairway leading thereto.

NOTE ON ELEVATORS AND ELEVATOR ENCLOSURES.

See elevator code issued by the Industrial Commission.

SECTION 8. ROOMS AND WINDOWS.

Order 5717. Size of Rooms. Every sleeping room shall be of sufficient size to afford at least 400 cubic feet of air space for each occupant over twelve years of age, and 200 cubic feet for each occupant under twelve years. No greater number of occupants than the number thus established, shall be permitted in any such room.

Order 5718. Basement Rooms. Every basement, living or sleeping room shall be at least 8 feet high from floor to ceiling. The ceiling shall be at least 4 feet above the outside grade. The walls and floor shall be dampproof and waterproof.

No rooms wherein persons are forcibly confined shall be located in a basement.

Order 5719. Windows. The outside windows in every sleeping or living room shall have a total area of at least one-tenth of the floor area of the room, but not less than 12 square feet. The top of at least one such window shall be not less than 6½ feet above the floor, and the upper half of it shall be made so as to open the full width.

See also orders 5203-5206, inclusive.

SECTION 9. LAUNDRIES, BOILER AND FURNACE ROOMS.

Order 5720. All boiler and furnace rooms, including breaching, and all laundries and drying rooms, in all buildings accommodating transients and in hospitals, asylums and other places of detention, shall be enclosed with standard fireproof enclosures and fireproof floor and ceiling.

See also orders 5210-5223, inclusive.

SECTION 10. VENTILATION.

Order 5721. Pure air shall be provided at the rate of 1,800 cubic feet per hour per person; provided the air in every public part of the building shall be changed at least twice each hour.

Note. In rooms having sufficient window space, the above standard of ventilation can be secured if the windows are opened at top and bottom and a board is placed at the bottom to prevent drafts. This holds true in winter as well as in summer.

SECTION 11. TOILET ROOMS.

Order 5722. Every apartment shall have a water-closet in a bathroom or separate compartment; except that where there are apartments consisting of but one or two rooms there shall be at least one water-closet for every two such apartments if shown on approved plans.

All other buildings of this classification shall have at least one water-closet for every 15 rooms or fraction thereof.

See also orders 5250-5265, and 5723.

Note. Rooms with private water-closets shall not be considered in counting either the number of rooms or the number of water-closets.

Water-closets and urinals and pipes connecting therewith shall be protected against frost as provided in order 5261. In every apartment house where any such closet or urinal is not located within a private apartment, such protection shall be furnished by the owner.

SECTION 12. WATER SUPPLY.

Order 5723. In every building of this classification where city water supply is available or can be made available, there shall be at least one proper sink or washbowl with running water. In apartment houses there shall be such a sink or washbowl in each apartment.

SECTION 13. REPAIRS.

Order 5724. Every building of this classification, and all the parts thereof, shall be kept in good repair and the roof shall be kept so as not to leak and all rain water shall be so drained and conveyed therefrom as not to cause dampness in the walls or ceilings.

SECTION 14. CLEANLINESS.

Order 5725. Every building shall be kept clean and shall also be kept free from any accumulation of dirt, filth, rubbish, garbage, or other matter in or on the same or in the yards, courts, passages, areas or alleys connected with or belonging to the same.

Note. It is the duty of the owner as well as the tenant, to see that this order is complied with.

SECTION 15. STANDPIPES AND FIRE EXTINGUISHERS.

Order 5726. For exterior standpipes see order 5130.

Standard interior standpipes (order 5134) shall be provided in every building which is more than two stories high and accommodates 20 or more transients, and in all hospitals, asylums and other places of detention. Not more than 75 feet of hose (order 5134) shall be attached to each standpipe at each floor level. The number and location of interior standpipes shall be such that the hose will reach at least two feet inside of each room.

In the above buildings where adequate water supply is not available, and in buildings accommodating less than 20 transients where interior standpipes are not provided, a standard fire extinguisher (order 5135) shall be placed on each floor at the head of each stairway and at each elevator or group of elevators.

SECTION 16. FIRE ALARM.

Order 5727. In every building which accommodates 20 or more transients, there shall be a proper alarm or gongs which can be operated from any story and can be heard throughout the building. Every such alarm system shall be tested at least once every week.

SECTION 17. DIRECTIONS FOR ESCAPE.

Order 5728. In every room liable to be used by transients a notice shall be conspicuously posted giving complete and plain directions for reaching at least two exits.

INDEX

BY ORDER NUMBERS

- Aisles,
  - Apartment houses, hotels, etc., 5714.
  - Factories, office buildings, etc., 5407, 5410.
  - General requirement, 5133.
  - Schools, libraries, museums, etc., 5609, 5615.
  - Theaters, assembly halls, etc., 5514-5517.
- Alley, definition of, 5107.
- Alterations in buildings, 5001.
- Appeal (page 9).
- Apartment houses, hotels, places of detention, etc.,
  - Basement rooms, 5718.
  - Boiler and furnace rooms, fire prevention, 5720, 5210-5217.
  - Business on first floor, required construction, 5705.
  - Chimneys, 5218-5223.
  - Cleanliness, 5725.
  - Construction, type of, 5702.
  - Corridor and dividing partitions, 5707.
  - Courts and shafts, 5709, 5204-5206.
  - Design, 5200, 5300-5320.
  - Directions for escape, 5728.
  - Elevators, (See Elevator Code).
  - Exit doors, 5713, 5132.
  - Exits, number, location and type, 5710, 5133.
  - Exits, total width required, 5712.
  - Fire alarm, 5727.
  - Fire escapes, 5710, 5121-5131.
  - Fire extinguishers, 5726, 5135.
  - Fireproof construction, where required, 5702.
  - First floor fireproof, 5704.
  - Garage on first floor, required construction, 5705.
  - Height, limit of, 5702.
  - Inflammable material, isolation of, 5706.
  - Lighting, 5715, 5224, 5225.
  - Ordinary construction, where required, 5703.
  - Passageways, 5714.
  - Plans approved of, 5008.
  - Repairs, 5724.
  - Scuttle, 5716.
  - Size of rooms, 5717.
  - Size of windows, etc., 5719, 5203.
  - Stairways, 5711, 5115-5119.
  - Standpipes, 5726, 5130, 5134.
  - Toilet rooms, 5722, 5250-5265.
  - Ventilation, 5721.
  - Water supply, 5723.
  - Yards, 5708.
- Approved, defined (page —).
- Asbestos curtain, 5521.
- Assembly halls. (See Theaters).
- Asylums (See Apartment houses).
- Automatic fire door, 5110.
- Automatic sprinklers,
  - Factories, office buildings, etc., 5412.
  - General requirement, 5136.
  - Theaters, assembly halls, etc., 5535.
- Basement, definition, 5105.
- Basement rooms,
  - Apartment houses, hotels, etc., 5718.
  - Hospitals, asylums, convents, etc., 5718.
  - Jails, etc., 5718.
- Beams, wood, framing, 5320.
- Bearing walls, brick, required construction, 5304.
- Bearing walls, wood, 5318.
- Boiler room, fire prevention,
  - Apartment houses, hotels, etc., 5720.
  - General requirement, all buildings, 5210.
  - Hospitals, convents, asylums, jails, etc., 5720.
  - Protection, floor, wall and ceiling, 5211-5212.
  - Schools libraries, etc., 5617.
  - Theaters, assembly halls, etc., 5527.
- Boilers, furnaces, stoves, etc., 5210-5212.
- Booths, motion picture machine, 5538-5546.

Bond, masonry walls, 5304, 5307, 5308.
Brick walls, 5303-5312.
Building blocks, hollow, requirement for, 5309.
Building, height, 5104.
Buildings covered by code, 5000-5005.
Buildings not covered by code, 5006.

Capacity of buildings,
    Factories, office buildings, etc., 5405.
    Notice posted, 5415.
    Schools, libraries, museums, etc., 5607.
    Theaters, assembly halls, etc., 5506.
Chimneys, construction of etc.,
    Design, 5221, 5223.
    Flue lining, 5219.
    Large chimneys, 5220.
    Masonry, 5218-5219.
    Metallic chimneys, 5222.
    Protection of, 5218.
City regulations, 5007.
Club houses (See Apartment houses).
Combustible ceiling, 5114.
Combustible partition, 5114.
Concrete blocks, 5303, 5309.
Concrete materials, 5314.
Concrete, plain, walls, 5315.
Concrete, reinforced, allowable stresses in, 5313.
Concrete, reinforced, minimum requirement, 5313.
Construction, class of, restrictions,
    Apartment houses, hotels, etc., 5702-5707, 5201.
    Assembly halls, 5503, 5201.
    General requirements, all buildings, 5201.
    Hospitals, convents, asylums, jails, etc., 5702-5707, 5201.
    Schools, 5602, 5603, 5201.
    Theaters, 5502, 5201.
    Toilet rooms, 5257, 5258.
Convents, (See Apartment houses).
Courts,
    Apartment houses, hotels, etc., 5709.
    Definition of, 5107, 5204.
    Hospitals, convents, asylums, jails, etc., 5709.
    Schools, 5605.
    Size of, 5205.
    Theaters, assembly halls, etc., 5504, 5204-5206.
    Ventilation of, 5206.
Curtain walls, construction, 5305.

Dance halls, (See Assembly halls).
Design and supervision of buildings, requirement, 5200.
Dry cleaning establishments, requirements for, 5235.

Electric wiring, 5225.
Elevators, (See Elevator Code),
    Theaters and assembly halls, 5518.
Exhibition buildings (See Factories).
Existing buildings, 5005.
Exit doors,
    Apartment houses, hotels, etc., 5713, 5132.
    Fire escapes, 5122.
    Hospitals, convents, asylums, jails, etc., 5713, 5132.
    Schools, libraries, etc., 5608, 5132.
    Standard 5132.
    Theaters, assembly halls, etc., 5511, 5132.
Exit lights,
    Apartment houses, hotels, etc., 5715.
    Factories, office buildings, etc., 5410.
    General requirement, all buildings, 5132.
    Hospitals, convents, asylums, jails, etc., 5715.
    Schools, libraries, museums, etc. 5609.
    Theaters assembly halls, etc., 5530-5531.
Exits,
    Apartment houses, hotels, etc., 5710-5715, 5123.
    Factory, office buildings, etc., 5401-5404, 5123.
    General requirement, 5123.
    Hospitals, convents, asylums, jails, etc., 5710-5715, 5123.
    Schools, libraries, etc., 5606-5608, 5123.
    Theaters, assembly halls, etc., 5507-5512, 5123.

Factories, office and mercantile buildings,
  Automatic sprinklers, 5412, 5136.
  Boilers, protection of, 5210-5212.
  Capacity, 5405.
  Chimneys, construction of, etc., 5218-5223.
  Construction, class, height, etc., 5201, 5202.
  Design, 5300-5320.
  Dressing rooms, 2218.
  Drinking water, 2217.
  Electrical work, 5225.
  Elevator (See Elevator Code).
  Enclosed stairways, where required, 5403.
  Exit doors, 5406, 5132.
  Exit door signs, 5406.
  Exit lights, 5406, 5132.
  Exits, number and location, 5401, 5133.
  Exits, type of, 5402.
  Fire Alarm, 5413.
  Exits, required total width, 5404.
  Fire escapes, 5121-5131.
  Fire escape, where required, 5403.
  Fire extinguishers, 5411, 5135.
  Floor opening, 5409.
  Furnace pipes, 5215-5216.
  Lavatories, 2214, 2215, (page —).
  Lighting, 5410, 5224.
  Load allowed on floors, notices, 5414, 5415.
  Passageways, requirements, 5407.
  Plans, approval of, 5008.
  Scuttle, 5408.
  Smoke pipes, 5213.
  Stairways, 5115-5119.
  Stairways, enclosure, 5403.
  Standpipes, 5411, 5130, 5134.
  Steam pipes, 5214.
  Toilet rooms, 2203 (page 80), 5250-5265.
  Trap doors, 5409.
  Window cleaners safety device, 56 (page 61)
Fire escapes,
  Apartment houses, hotels, etc., 5710, 5121-5131.
  Balanced stairway, 5127.
  Brackets, 5125.
  Convents, hospitals, asylums, jails, etc., requirement for, 5710, 5121-5131.
  Exits to, 5122.
  Factories, office buildings, etc., 5402, 5403, 5121-5131.
  Frame bars, 5124.
  Hand railings, 5128.
  Ladder to roof, 5129.
  Location, 5121.
  Material, 5123.
  Platforms, 5124.
  Schools, libraries, etc., 5606, 5607, 5121-5131.
  Stairways, 5126.
  Standpipe, 5130.
  Strength, 5123.
  Theaters, assembly halls, etc., 5510, 5121-5131.
  Treads, 5126.
  Types other than stairway, 5131.
Fire extinguishers,
  Apartment houses, hotels, etc., 5726.
  Factories, office buildings, etc., 5411.
  General requirements, 5135.
  Hospitals, convents, asylums, jails, etc., 5726.
  Schools, libraries, etc., 5621.
  Theaters assembly halls, etc., 5534.
Fire proof construction, 5100.
Fire stops in partitions, 5112, 5318, 5704.
First floor, defined, 5105.
Floor area, maximum permitted, 5202.
Floor loads, 5300.
Foundation loading, 5302.
Floor openings in factories, 5409.
Frame buildings, 5103.
Furnace rooms (see Boilers, etc.).
Furnaces, 5210-5219.
Furring, wood, 5319.

Garages, requirements for,
    Apartments over, 5705.
    Assembly hall over, 5505.
    Chimney construction, 5218-5219.
    Class of construction, 5240.
    Electric wiring, 5225.
    Elevators (See Elevator Code).
    Heating system, fire prevention, 5210-5217.
    Hotel over, 5705. (See order 5701).
    Roof construction, 5102, 5106, 5300.
    Toilet rooms, 5250-5265.
    Wall construction, 5304, 5308, 5309.
Gas lights, 5224 (See also Lighting).

Halls, (See Assembly halls).
Heating apparatus, protection of, 5210-5212.
Height of buildings, limit of,
    General requirement, 5201.
    Schools, 5601, 5201.
    Theaters, assembly halls, etc., 5502, 5201.
Hollow masonry walls, 5308.
Hospitals (See Apartment houses).
Hot air flues
    General requirement, 5217.
    Schools, 5619, 5217.
Hot air pipes, protection of, 5215.
Hotels, (see Apartment houses).

Incombustible,
    Roof covering, 5106.
    Material, 5100.

Jails, (See Apartment houses).

Laundries, requirements for,
    Apartment houses, hotels, etc., 5720.
    Hospitals, convents, asylums, jails, etc., 5720.
    Schools, 5617.
Laundry drying rooms,
    Apartment houses, hotels, etc., 5720.
    General requirements, all buildings, 5230.
    Hospitals, convents, asylums, jails, etc., 5720.
Libraries (See Schools).
Lighting electricity,
    Apartment houses, hotels, etc., 5715.
    Assembly halls, 5531.
    Factories, office buildings, etc., 5410.
    Garages, 5225.
    General requirement, all buildings, 5225.
    Hospitals, convents, asylums, jails, etc., 5715.
    Schools, libraries, etc., 5609, 5620.
    Theaters, 5530.
Lighting, oil and gas,
    Apartment houses, hotels, etc., 5715.
    Assembly halls, 5529, 5531.
    Factories, office buildings, etc., 5410.
    General Requirement, all buildings, 5224.
    Hospitals, convents, asylums, jails, etc., 5715.
    Schools, libraries, etc., 5609, 5620.
    Theaters, 5529, 5530.
Lodge hall (See Assembly halls).

Masonry, allowable stresses, 5303.
Metal lumber, 5100, 5100-A, 5100-B.
Mill construction, 5101.
Motion picture machines and booths, 5538-5546.
Museums (See Schools).

Office buildings (See Factories).
Oil lights, 5224 (See also Lighting).
Old walls, 5312.
Ordinary construction, 5102.

Panic hardware, on exit doors, 5132.
Parapet walls, construction of, 5310.
Pile foundation, 5302.
Plans, approval of, 5008.

- Registers, protection of, 5216.
- Repairs to building, 5005.
- Roof loads, 5300.

- Schools, libraries and museums,
  - Assembly halls, 5615.
  - Basement exits, 5606.
  - Basement rooms, 5614.
  - Basement stairways, 5606.
  - Boiler and furnace room, fire prevention, 5617, 5210-5219.
  - Capacity, 5607.
  - Closets below stairways, 5606.
  - Construction, class of, 5602.
  - Design, 5200, 5300-5320.
  - Exit doors, 5608, 5132.
  - Exits, number, location and type, 5606, 5133.
  - Exits, total width required, 5607.
  - Exposure and courts, 5605.
  - Fire alarms, 5622.
  - Fire escapes, 5606, 5121-5131.
  - Fire extinguishers, 5621, 5135.
  - First floor required fireproof, 5603.
  - Handrails on stairs, 5606.
  - Heating, 5619.
  - Height, maximum, 5601.
  - Height of rooms, 5611.
  - Lighting, 5620, 5224, 5225.
  - Motion picture machine booths, 5538-5546.
  - Passageways, 5609.
  - Plans, approval of, 5008.
  - Scuttle, 5610.
  - Seats, desks and aisles, 5615.
  - Size of rooms, 5611.
  - Stairways, 5606, 5115-5119.
  - Standpipes, 5621, 5130, 5134.
  - Sub-division for fire protection, 5604.
  - Toilet rooms, 5618, 5250-5265.
  - Ventilation, 5619.
- Scuttle,
  - Apartment houses, hotels, etc., 5716.
  - Factories, office buildings, etc., 5408.
  - Schools, libraries, museums, etc., 5610.
- Seats,
  - Schools, etc., 5615.
  - Theaters, assembly halls, etc., 5513.
- Semi-fireproof,
  - Partition, 5112, 5102.
  - Ceiling, 5113.
- Service closets, 5266.
- Smoke pipes, protection of, 5213.
  - Smokestacks, 5218-5223.
  - Sprinklers, (See Automatic sprinklers).
- Stairways,
  - Apartment houses, hotels, etc., 5710-5712, 5115-5119.
  - Exterior enclosed, 5115.
  - Factories, office buildings, stores, 5402-5404, 5115-5119.
  - Fire escape, 5121-5131.
  - General recommendation (page 22)
  - Handrails general requirement, 5118.
  - Hospitals, convents, asylums, jails, etc., 5710-5712, 5115-5119.
  - Interior enclosed, 5116.
  - Risers 5119.
  - Schools, libraries, etc., 5606, 5607, 5115-5119.
  - Smoke proof tower, 5115.
  - Theaters, assembly halls, etc., 5507-5510, 5115-5119.
  - Treads, 5119.
  - Width, general requirement, 5117.
  - Winders, 5119.
- Standard fire door, 5110.
- Standard fireproof enclosure, 5109.
- Standard fireproof partition, 5109.
- Standard fire wall, 5108.
- Standard fire window, 5111.
- Standing room in theater and assembly halls, 5506.
- Standpipes,
  - Apartment houses, hotels, etc., 5726.
  - Exterior, 5130.
  - Factories, office buildings, etc., 5411.

    Hospitals convents, asylums, jails, etc., 5726.
    Interior, 5134.
    Schools, libraries, etc., 5621.
    Theaters, assembly halls, etc., 5533.
Steam pipes, protection of, 5214.
Steel construction, allowable stresses, 5316.
Steel partitions, 5318, 5112.
Steel, reinforcing, 5313-5314.
Steel structure, requirements, 5316.
Stone facing, 5307.
Stone walls, construction, 5306.
Stores, etc., (See Factories).
Stories, number of, 5105.
Stoves, 5210-5219.
Street, definition of, 5107.
Stresses in concrete, 5313.
Stresses in masonry, 5303.
Stresses in steel and iron, 5316.
Stresses in wood, 5317.
Structural design (all buildings), 5300-5320.

Thickness of walls, 5304-5310, 5315, 5108.
Tile, hollow, requirement for, 5309.
Tile, hollow, walls, 5309.
Timber construction, 5317-5320.
Toilet rooms.
    Apartment houses, hotels, etc., 5722.
    Cleanliness, etc., 5264, 5265.
    Compartment doors, 5259.
    Factories, office buildings, etc., 2203 (page 80)
    Fixtures, 5260.
    Floor construction, 5257.
    General requirement, 5250.
    Hospitals, convents, asylums, jails, etc., 5722.
    Light, 5253, 5255.
    Location, 5253, 5254.
    Outdoor toilets, 5263.
    Partitions between fixtures, 5259.
    Permit for special toilets, 5262.
    Schools, 5618.
    Sex segregation, 5251, 5252.
    Size, 5256.
    Theaters, assembly halls, etc., 5532.
    Urinals, 2553, 5259, 5260.
    Ventilation, 5253, 5254.
    Walls and ceiling, construction, 5258.
Tenement house law (page 113)
Tenement houses, (See Apartment houses).
Terra Cotta facing, 5307.
Theaters and assembly halls,
    Aisles, 5514, 5517.
    Assembly hall over garages, 5505.
    Automatic sprinklers, 5535, 5136.
    Balcony construction, 5502, 5503.
    Boiler and furnace rooms, fire prevention, 5527, 5210-5217.
    Capacity, 5506.
    Chimneys, 5218-5223.
    Construction, restrictions, 5502, 5503.
    Design, 5200, 5300-5320.
    Dressing rooms, etc., 5526.
    Elevators, 5518. (See Elevator Code).
    Exit doors, 5511, 5132.
    Exit lights, 5530, 5531.
    Exits, number and location, 5507.
    Exits, required total width, 5512.
    Exits, type of, 5508.
    Exposure and courts, 5504.
    Fire alarm, 5536.
    Fire escapes, 5510, 5121-5131.
    Fire extinguishers, 5534, 5135.
    Fire proof curtain, 5521.
    Foot light trough, 5524.
    Gallery construction, 5502, 5503.
    Heating, 5528.
    Height, limit of, 5502, 5503.
    Inclines, 5516.
    Lighting, 5529, 5224, 5225.
    Mirrors, etc., 5537.

- Motion picture machine booth, 5538-5546.
- Passageways, etc., 5515, 5517.
- Plans, approval of, 5008.
- Proscenium wall, 5520.
- Seats, 5513.
- Separation from other portions of building, 5505.
- Sleeping room over, 5505.
- Stage, 5519-5526.
- Stage ventilator, automatic, 5522.
- Stairways, 5509.
- Standpipes, 5533, 5130, 5134.
- Toilet rooms, 5532, 5250-5265.
- Ventilating, 5528.
- Window cleaners safety device, 56 (page 61)

Trap doors, etc., in factories, 5409.

Urinals, (See Toilet rooms).

Ventilating flues,
- General requirements, all buildings, 5217.
- Schools, 5619, 5217.

Ventilation,
- Apartment houses, hotels, etc., 5721.
- Convents, 5721.
- Dry cleaning establishments, 5235.
- Hospitals, convents, asylums, jails, etc., 5721.
- Schools, libraries, etc., 5619.
- Theaters assembly halls, etc., 5528.
- Toilet rooms, 5253.

Village regulations, 5007.

Walls, thickness of, 5303-5310, 5315, 5108.
Warehouses, (See Factories, etc.).
Window cleaners safety device, 56 (page 61)
Windows,
- Apartment houses, hotels, 5719, 5203.
- Division walls, 5202.
- Dry cleaning establishments, 5235, 5203.
- General requirements, 5203.
- Hospitals, convents, asylums, jails, etc., 5719, 5203.
- Schools, 5609.
- Toilet rooms, 5253.

Wind pressure on chimneys, 5223.
Wind pressure on buildings, 5301.
Wired glass, 5108, 5109, 5111, 5112.
Wiring, electric, 5225.
Wood construction, allowable stresses, 5317.
Wood construction, requirements, 5317.

[illegible]

BUILDING CODE

Reprinted 1927

INDUSTRIAL COMMISSION
OF WISCONSIN
1927

Building Code

State of Wisconsin

Reprinted 1927

The following orders have been amended since 1921, and are included in this reprint: 5225, 5316, 5503, 5528, 5619, 5620.

The following orders have been repealed since 1921: 5309, 5528, 5619, 5721.

The following new orders have been added since 1921: 5330, 5331, 5332, 5333, 5334, 5335, 5336.

Issued by

Industrial Commission of Wisconsin

MADISON

STATE PUBLICATIONS COVERING LAWS RELATIVE TO BUILDINGS AND BUILDING WORK

Issued by the Industrial Commission.

- Building Code
- State Electrical Code
- Elevator Code
- Boiler Code
- Industrial Lighting Code
- General Orders on Existing Buildings
- General Orders on Safety in Building Construction
- General Orders on Fire Prevention
- General Orders on Sanitation
- General Orders on Safety
- Refrigerator Code
- General Orders on Spray Coating.

State Board of Health

- Plumbing Code
- Code for Rural School Privies
- Rules for Sanitary Care of Schools
- Construction and Operation of Slaughterhouses
- Sewage Systems for Farm Homes
- Wisconsin Waterworks Sewage and Refuse Disposal Code
- Wisconsin Public Comfort Station Code

Department of Public Instruction.

- Rural School Requirements for special State Aid.
- Fire Protection and Safety in Schools.

Any of the above bulletins will be furnished or sent on request.

CONSULT OR WRITE RESPECTIVE DEPARTMENTS AS FOLLOWS:

1. Building Construction, Safety, Sanitation, etc., Industrial Commission.
2. Schools, Assistance in Layout, Economy and Administration, Supervisor of Buildings, Department of Public Instruction.
3. Electrical Work, Industrial Lighting, etc., Industrial Commission.
4. Fire Prevention, Fire Protection, etc., Industrial Commission.
5. Heating, Ventilating, etc., Industrial Commission.
6. Plumbing, State Board of Health. (Plumbing Division).
7. Water Supply, Sewage Disposal. etc., State Board of Health. (Plumbing Division).
8. Industrial Waste, Sanitary Engineer, State Board of Health.
9. Asylums and Places of Detention, State Board of Control.
10. Food Industries, Special Sanitary Requirements, Dairy and Food Commission.

DEMOCRAT PRINTING COMPANY
MADISON, WISCONSIN

TABLE OF CONTENTS

By Pages

Page

Introduction 7

Part I. Scope of Building Code.

Section 1. New Buildings and Additions 11
Section 2. Alterations 11
Section 3. Change of Use 11
Section 4. Existing Buildings 11
Section 5. Buildings not included 12
Section 6. Local Regulations 12
Section 7. Approval of Plans 12

Part II. Definitions and Standards.

Section 1. Fireproof and Protected Construction 15
Section 2. Mill Construction 18
Section 3. Ordinary Construction 18
Section 4. Frame Buildings 19
Section 5. Height of a Building 19
Section 6. Basement; First Floor; Number of Stories 19
Section 7. Incombustible Roof Covering 20
Section 8. Street, Alley, Court 20
Section 9. Standard Fire Stops 20
Section 10. Stairways 23
Section 11. Horizontal Exits 28
Section 12. Fire Escapes 29
Section 13. Standard Exit Doors 37
Section 14. Location and Maintenance of Exits 38
Section 15. Standpipes, Fire Extinguishers, and Sprinklers 38

Part III. General Requirements. Page

Section 1. Design and Supervision of Buildings 41
Section 2. Height and Class of Construction 41
Section 3. Floor Areas 43
Section 4. Windows and Courts 44
Section 5. Boilers, Furnaces and Stoves 46
Section 6. Smoke Pipes 49
Section 7. Steam Pipes 50
Section 8. Air Pipes and Registers 50
Section 9. Chimneys 51
Section 10. Lights 53
Section 11. Electrical Work 54
Section 12. Special Hazards 54
Section 13. Toilet Rooms 56

Part IV. Structural Design.

Section 1. Floor and Roof Loads 64
Section 2. Wind Pressure 66
Section 3. Foundations 67
Section 4. Masonry Construction 67
Section 5. Concrete Construction 71
Section 6. Steel and Iron Construction 73
Section 7. Wood Construction 82
Section 8. Hollow Tile and Concrete Block 84

Part V. Factories, Office and Mercantile Buildings.

Section 1. Classification 90
Section 2. Exits 90
Section 3. Scuttle 94
Section 4. Trap Doors and Floor Openings 94
Section 5. Lighting 94
Section 6. Toilet Rooms, Lavatories and Dressing Rooms 95
Section 7. Standpipes, Fire Extinguishers and Sprinklers 96
Section 8. Fire Alarm 97
Section 9. Notice of Loads and Persons Accommodated 97

Part VI. Theatres and Assembly Halls. Page

Section 1. Classification ---------- 99
Section 2. Height and Class of Construction---------- 99
Section 3. Exposure and Courts ---------- 102
Section 4. Buildings Used for Other Purposes---------- 103
Section 5. Capacity ---------- 103
Section 6. Exits ---------- 104
Section 7. Seats ---------- 105
Section 8. Aisles and Passageways ---------- 106
Section 9. Elevators ---------- 107
Section 10. Stage ---------- 107
Section 11. Dressing Rooms, Property Rooms, Etc.---------- 110
Section 12. Boiler and Furnace Rooms---------- 110
Section 14. Lights ---------- 111
Section 15. Toilet Rooms ---------- 112
Section 16. Fire Protection ---------- 113
Section 17. Mirrors: False Openings ---------- 114
Section 18. Motion Picture Machines and Booths---------- 114

Part VIII. School Buildings, Libraries and Museums.

Section 1. Classification ---------- 118
Section 2. Height and Class of Construction---------- 118
Section 3. Exposure and Courts ---------- 119
Section 4. Exits ---------- 119
Section 5. Scuttle ---------- 121
Section 6. Rooms ---------- 122
Section 7. Assembly Halls ---------- 123
Section 8. Seats, Desks, and Aisles ---------- 123
Section 9. Boiler and Furnace Rooms---------- 124
Section 10. Toilet Rooms ---------- 124
Section 12. Lighting ---------- 125
Section 13. Standpipes and Fire Extinguishers---------- 125
Section 14. Fire Alarms ---------- 126

Part VIII. Apartment Houses; Hotels and places of Detention.

Section 1. Classification ---------- 127
Section 2. Height and Class of Construction and Fire Stops ---------- 127

Page
Section 3. Yards 129
Section 4. Courts and Shafts 130
Section 5. Exits 130
Section 6. Lights 132
Section 7. Scuttle 132
Section 8. Rooms and Windows 133
Section 9. Laundries, Boiler and Furnace Rooms 133
Section 11. Toilet Rooms 134
Section 12. Water Supply 134
Section 13. Repairs 134
Section 14. Cleanliness 134
Section 15. Standpipes and Fire Extinguishers 135
Section 16. Fire Alarm 135
Section 17. Directions for Escape 135
Index 136

INDUSTRIAL COMMISSION OF WISCONSIN

FRED M. WILCOX, *Chairman* VOYTA WRABETZ
R. G. KNUTSON

A. J. ALTMEYER, *Secretary*
R. McA. KEOWN, *Engineer*
W. C. MUEHLSTEIN, *Building Engineer*

BUILDING CODE

INTRODUCTION

The Wisconsin Building Code first became effective September 15, 1914. Additions and changes have been made at intervals since that date, the latest amendments having been adopted in January, 1926. This code has been adopted by the Industrial Commission in discharge of its duties under Sections 101.01 to 101.28 inclusive, of the statutes of Wisconsin. It supplements the requirement of Section 101.05, to the effect that "every employer and every owner of a place of employment and a public building now or hereafter constructed shall so construct, repair or maintain such place of employment or public building and every architect shall so prepare the plans for the construction of such place of employment or public building as to render the same safe."

Persons who violate the provisions of this code under Sections 101.18 and 101.28 become liable to a forfeiture of $10 to $100 for each day and each instance of violation. This code applies to all places of employment and to all public buildings. The latter term is defined in Section 101.01 of the statutes to "mean and include any structure used in whole or in part as a place of resort, assemblage, lodging, trade, occupancy, or use by the public, or by three or more tenants."

It should be noted that the orders in this code are binding alike upon every owner of a place of employment or a public building, and upon architects who prepare plans for the construction of places of employment or public buildings. The term "owner", as here used, is defined in the statutes to include "every person, firm, corporation, state, county, town, city, village, manager, representative, officer, or other person having ownership, control, or custody of any place of employment or public building, or of the construction, repair, or maintenance of any public building, or who prepares plans for the construction of any place of employment or public building."

History of Building Code

In the preparation of the Wisconsin Building Code, the Industrial Commission has had the advice and assistance of a Building Code Committee. This Committee, as originally constituted, was composed of the following named persons:

A. C. Eschweiler, architect, Milwaukee.
C. F. Ringer, former Inspector of Buildings, Milwaukee.
Howland Russell, architect, Milwaukee.
C. A. Halbert, civil engineer, Railroad Commission.
Sidney J. Williams, deputy, Industrial Commission.

In the preparation of the building code, this committee received the assistance of a large number of other persons, with wide practical experience in this field, including architects, builders, fire chiefs, city officials, and insurance men. All of the original members of the Building Code Committee have since 1914 resigned their membership. In their place other practical builders and architects have been appointed. The membership of the present Building Code Committee is given on page 10.

Both the original code and amendments, subsequently adopted, were submitted to public hearings after having been drafted by the Building Code Committee. Notices of such hearings have, in each case, been sent by letter to a very large number of persons, and in addition they have been given widespread newspaper publicity. Many of these hearings have had a very large attendance and many valuable suggestions have resulted therefrom.

In this manner the commission has sought to make certain that its orders shall be both practical and reasonable. The provisions of the Wisconsin Building Code generally have the endorsement of responsible architects and builders. Many of the cities of the state have re-adopted the building code in total as a city ordinance with additional and stringent requirements, as deemed necessary to meet local conditions.

Administration

The building code will be enforced in cooperation with local officials, who are required by law to enforce all orders of the commission which are germane to their respective duties (Sec. 101.28). With the state code as a foundation, city ordinances may go more into detail, if desired, or may contain more stringent requirements than those of the state code.

To secure the best results, plans should be filed with and approved by a city building inspector. This is now required in twenty cities in Wisconsin. The Industrial Commission strongly recommends all cities to require building permits and thus prevent the construction of buildings which will endanger the lives of citizens and increase the possibility of disastrous general conflagration.

Appeal

Any person who considers any part of the building code, or any official's interpretation of the code, to be unreasonable, may appeal to the commission to interpret, modify, or suspend the same. (See Sections 101.15 to 101.17).

A building code committee, consisting of the architects and other experts listed below, acts as an advisory committee to the commission. Any person who is dissatisfied

It should be noted that the orders in this code are binding alike upon every owner of a place of employment or a public building, and upon architects who prepare plans for the construction of places of employment or public buildings. The term "owner", as here used, is defined in the statutes to include "every person, firm, corporation, state, county, town, city, village, manager, representative, officer, or other person having ownership, control, or custody of any place of employment or public building, or of the construction, repair, or maintenance of any public building, or who prepares plans for the construction of any place of employment or public building."

History of Building Code

In the preparation of the Wisconsin Building Code, the Industrial Commission has had the advice and assistance of a Building Code Committee. This Committee, as originally constituted, was composed of the following named persons:

A. C. Eschweiler, architect, Milwaukee.
C. F. Ringer, former Inspector of Buildings, Milwaukee.
Howland Russell, architect, Milwaukee.
C. A. Halbert, civil engineer, Railroad Commission.
Sidney J. Williams, deputy, Industrial Commission.

In the preparation of the building code, this committee received the assistance of a large number of other persons, with wide practical experience in this field, including architects, builders, fire chiefs, city officials, and insurance men. All of the original members of the Building Code Committee have since 1914 resigned their membership. In their place other practical builders and architects have been appointed. The membership of the present Building Code Committee is given on page 10.

Both the original code and amendments, subsequently adopted, were submitted to public hearings after having been drafted by the Building Code Committee. Notices of such hearings have, in each case, been sent by letter to a very large number of persons, and in addition they have been given widespread newspaper publicity. Many of these hearings have had a very large attendance and many valuable suggestions have resulted therefrom.

In this manner the commission has sought to make certain that its orders shall be both practical and reasonable. The provisions of the Wisconsin Building Code generally have the endorsement of responsible architects and builders. Many of the cities of the state have re-adopted the building code in total as a city ordinance with additional and stringent requirements, as deemed necessary to meet local conditions.

Administration

The building code will be enforced in cooperation with local officials, who are required by law to enforce all orders of the commission which are germane to their respective duties (Sec. 101.28). With the state code as a foundation, city ordinances may go more into detail, if desired, or may contain more stringent requirements than those of the state code.

To secure the best results, plans should be filed with and approved by a city building inspector. This is now required in twenty cities in Wisconsin. The Industrial Commission strongly recommends all cities to require building permits and thus prevent the construction of buildings which will endanger the lives of citizens and increase the possibility of disastrous general conflagration.

Appeal

Any person who considers any part of the building code, or any official's interpretation of the code, to be unreasonable, may appeal to the commission to interpret, modify, or suspend the same. (See Sections 101.15 to 101.17).

A building code committee, consisting of the architects and other experts listed below, acts as an advisory committee to the commission. Any person who is dissatisfied with any technical ruling of any inspector, may appeal to the building code committee, whose decision will be submitted to the commission for consideration.

Building Code Committee

Peter Brust, architect, Milwaukee.
Allen D. Conover, architect, Madison (Chairman).
John H. Findorff, general contractor, Madison.
J. E. Florin, Superintendent of Fire Prevention, Madison (Home address, Menomonie, Wis.)
Henry A. Foeller, architect, Green Bay.
Peter Nelson, contractor, La Crosse.
Arthur Peabody, state architect, Madison.
W. C. Muehlstein, Industrial commission, Madison.

Part I

SCOPE OF BUILDING CODE

SECTION 1. NEW BUILDINGS AND ADDITIONS.

Order 5000. This code shall apply to all new buildings and additions except those exempted in order 5006.

SECTION 2. ALTERATIONS.

Order 5001. This code shall apply to all alterations which affect the structural strength, fire hazard, exits, lighting or sanitary condition of any building except those exempted in order 5006. This does not include ordinary repairs necessary for the maintenance of any building.

SECTION 3. CHANGE OF USE.

Order 5002. This code shall apply as far as possible to all buildings which are to be devoted to a new use for which the requirements of this code are in any way more stringent than the requirements covering the previous use of the building.

Note. Under this order no public building or place of employment may be changed in use, or the existing use extended, unless the requirements applying to the new use are complied with.

SECTION 4. EXISTING BUILDINGS.

Order 5005. Every new installation, and every repair exceeding 50 per cent, of any

Roof covering
Toilet room
Boiler, furnace, or stove
Chimney or smoke pipe
Motion picture machine or booth

shall comply with the corresponding requirements of this code

See also Orders 5001, 5002.

SECTION 5. BUILDINGS NOT INCLUDED.

Order 5006. This code does not apply to the following buildings:

(1) Private residences, and outbuildings in connection therewith, such as barns, private garages, etc.

Note. By private garage is meant a building used in connection with a private residence for the purpose of housing automobiles, or other motor driven vehicles, owned by the occupant of the residence, and used only for personal or family service. In any case where more than two such vehicles can be accommodated and one or more are owned by others than the occupant of the residence, the building is classified as a public garage.

(2) Flat buildings used as the residence of two families only, provided that not more than two persons are accommodated who are not members of the family.

(3) Buildings used for agricultural purposes which are not within the corporate limits of a city or village.

(4) Temporary buildings or sheds used for construction purposes only.

SECTION 6. LOCAL REGULATIONS.

Order 5007. This code shall not be understood to limit the power of cities, villages and towns to make or enforce additional or more stringent regulations provided the same do not conflict with this code, or with any other order of the Industrial Commission.

Note. Every municipality is recommended to adopt, for its own benefit:

(1) Definite fire limits, and regulations prohibiting the construction of frame buildings within such limits.

(2) Regulations governing the construction of private residences and other buildings not covered by this code.

(3) Other fire-preventive and sanitary regulations which cannot reasonably be included in a state code.

SECTION 7. APPROVAL OF PLANS.

Order 5008. Complete plans and specifications for all of the following buildings shall be submitted to the Industrial Commission for approval before letting contracts or commencing work:

Theaters and assembly halls;
Schools, colleges and academies;
Apartment houses, hotels and places of detention (see order 5701);

Factories, office and mercantile buildings, as follows:

(1) All buildings having floor or roof spans greater than 30 feet,

(2) All buildings which are more than two stories high,

(3) All buildings which are two stories high and are more than 5,000 square feet in area at the second floor level.

All plans shall be submitted in duplicate, except for private assembly halls, one or two room schools, and factory, office and mercantile buildings, and these latter may be submitted in duplicate if desired.

Note. Only those plans which are submitted in duplicate will receive the stamped approval of the Industrial Commission.

The location of adjoining streets, alleys, and lot lines, and of other buildings in the same lot (if any) shall be shown on the plans. All plans and specifications shall be signed by the architect, engineer or other chief designer.

This requirement shall apply to additions and enlargements, as well as to new buildings, and shall also apply to all cases where any of the above occupancies are to be located in a building previously used for other purposes.

This requirement shall not apply in cities where plans are examined and building permits are issued by a city building inspector, in a manner approved by the Industrial Commission.

After being approved by the Industrial Commission, plans and specifications shall not be changed in any respect which affects the safety of the occupants, or which is covered by this code, except with the written consent of the Industrial Commission.

Note. The Industrial Commission will be glad to examine and approve plans for other buildings covered by the code, such as small factories, officers and mercantile buildings which are not included above. All such buildings must, of course, comply with the code, whether plans are submitted or not.

Order 5009. If plans for any building are approved by the Industrial Commission, or by the city building inspector, plumbing inspector, or health department, the architect or builder shall keep at the building either the plans which were approved, or a copy thereof, and shall mark on such plans, in ink, the person or department which gave the approval, and the date thereof.

Note. The purpose of this order is to make it possible for any building or plumbing inspector, whether state or city, to ascertain when he visits a building under construction, whether the plans have been approved and by what department in case he finds any apparent violation. The architect can easily comply with this requirement as follows: When a plan has been approved, mark on the tracing and on blueprints previously made. "This plan was approved by——on——."

Part II

DEFINITIONS AND STANDARDS

Note. The definitions of orders 5100, 5101, 5102 apply to buildings which are required to be of fireproof, mill or ordinary construction, respectively. See orders 5201–5202, 5502–5503, 5602, 5702–5703.

SECTION 1. FIREPROOF AND PROTECTED CONSTRUCTION.

Order 5100. Fireproof Construction. A building is of fireproof construction if all the walls, partitions, piers, columns, floors, ceilings, roof and stairs are built of incombustible material; and if all metallic structural members are protected by an incombustible fire resisting covering of low heat conductivity, of not less than 2 inches thickness of concrete, or 3 inches thickness of other approved material, for columns; not less than 2 inches thickness for girders; and not less than 1½ inches thickness for other structural parts. This thickness shall be outside of the extreme edges of structural members. Such covering shall consist of Portland cement concrete, brick, terra cotta, or tile, laid in cement mortar, or other approved material and shall be properly reinforced, bonded, wired or otherwise secured in place. Steel reinforcement shall be protected as in order 5313. The plastering shall not be applied to wood lath or wood furring strips.

Floor panels may be built of approved metal (see Order 5316), designed to resist all stresses independent of any protective covering, protected on the upper and lower sides. Steel joists shall not be spaced more than 24 inches center to center well bridged with proper tension strips. Upper slab shall be reinforced concrete not less than 2 inches thick over all structural metal. Expanded metal or metal lath of proper weight and rigidity to span the joist spacing, well fastened to joists, may be used for reinforcement, but no metal less than 24 gauge shall be used. Lower side of joists shall be protected by not less than ⅞ inch cement plaster on expanded metal or metal lath. The un-per slab and plastered ceiling shall create air spaces between the metal floor supports completely isolated from the open atmosphere. All beams and girders supporting the floor panels shall be fully protected. Connections of steel joists to beams, girders, and other bearings shall be in a manner approved by the Industrial Commission. All steel joists shall receive a protective coat of lead and oil or bituminous paint before being placed in position. Steel joists shall not be used in floor panels having less than 3 feet of well ventilated air space below or in floor panels over damp basements.

Note. Expanded metal or metal lath weighing not less than 3¾ lbs. per square yard should be considered the minimum for joist spacing of 23½ inches, and 2¾ lbs. per square yard for joists spacing of 15¾ inches.

The trimmings and finished floor may be of wood, provided all spaces behind or below same are filled with incombustible material. Partitions entirely contained within a private apartment may be non-fireproof provided the partitions enclosing such apartment are fireproof.

A wood roof with incombustible roof covering will be permitted on a fireproof building not more than 85 feet high, provided the ceiling of the uppermost story is of fireproof construction not suspended from the roof.

A room or a portion of a building is of fireproof construction if it complies with all of the above requirements, and is separated from the rest of the building by means of fireproof walls, floors and ceiling, in which all openings are protected by means of fire doors or fixed standard fire windows.

For outside windows and doors see order 5201.

Note. (a) A "Fireproof" floor, ceiling, or wall is one of "fireproof construction." A "standard fire wall," "fireproof partition," etc., are defined in orders 5108-5113. "Incombustible" includes any material which will not burn or support combustion.

Note. (b) To secure the best protection against a severe fire, the finish, floors, trim, doors, windows, etc., should be made entirely of incombustible material.

The fireproof covering of exterior columns should be at least 4 inches thick to resist a severe fire.

Note. (c) The fireproofing of steel roof trusses may, if approved by the Industrial Commission, be omitted in cases where no increased hazard will result.

Order 5100-A. Protected Construction—Steel Joist Floor Panels. Floor panels will be considered of protected construction if built of approved metal (see Order 5316) designed to resist all stresses independent of any protective covering, and protected on the upper and lower sides. Steel joists shall not be spaced more than 24 inches center to center, well bridged with proper tension strips. Upper slab shall be reinforced concrete not less than 2 inches thick over all structural metal. Expanded metal or metal lath of proper weight and rigidity to span the joist spacing, well fastened to joists, may be used for reinforcement, but no metal less than 24 gauge shall be used. Lower side of joists and structural supports shall be protected by not less than 7/8 inch cement plaster on expanded metal or metal lath. The upper slab and plastered ceiling shall create air spaces between the metal floor supports completely isolated from the open atmosphere.

Connections of steel joists to beams, girders and other bearings shall be in a manner approved by the Industrial Commission.

All columns supporting floor panels of protected construction shall be protected as in Order 5100. The lower flanges of structural members other than steel joists shall be kept away 1 inch from ceiling plaster with metal furring. The metal of beams, girders and joists between the upper slab and plastered ceiling of floor construction need not be covered.

All steel joists shall receive a protective coat of oil and lead or bituminous paint before being placed in position.

Steel joists shall not be used in floor panels having less than three feet of well ventilated air space below or in floor panels over damp basements.

Order 5100-B. Protected Construction — Steel Stud Partitions. Partitions will be considered of protected construction if built of approved metal (see Order 5316) designed to resist all stresses independent of any protective covering, and protected on both sides with metal lath and not less than 3/4 inch of cement or gypsum plaster. The covering of metal lath and plaster shall create air spaces between the metal completely isolated from the open atmosphere.

Where steel studs are used in bearing partitions approved connection must be made with proper top and bottom bearings.

All steel studs shall receive a protective coat of oil and lead or bituminous paint before being placed in position.

SECTION 2. MILL CONSTRUCTION.

Order 5101. A building is of mill construction if all walls are built of incombustible material, and if all wood girders and joists are at least 5½ inches thick. No wood girder or joist shall measure less than 63 square inches and no wood posts less than 90 square inches in sectional area, except that 7½ x 7½ inch (or larger) posts may be used in the top story only. All structural steel or iron (not including post caps, bases, and joist hangers) shall be fireproofed with not less than one inch of incombustible material or with metal lath and cement or gypsum plaster. The lower thickness of each floor shall be not less than 2⅝ inch lumber with grooves and splines at the joints; this shall be covered with felt or building paper, and with a separate finished floor not less than 13-16 inch thick.

Note. Floor joists should be at least 7½ inches thick. The roof shall be at least 2½ inches thick and shall have an incombustible roof covering; if an airtight roof covering (such as felt or tin) is not used, then the roof planking shall be in two thicknesses, with felt or building paper between.

There shall be no openings in the floor unless protected by standard fire doors, and no concealed air spaces except such as are enclosed by incombustible material.

All stairways and elevators shall be enclosed with standard fireproof enclosures.

For outside windows and doors see order 5201.

SECTION 3. ORDINARY CONSTRUCTION.

Order 5102. A building is of ordinary construction if all enclosing walls consist of incombustible material, and the roof has an incombustible covering, but other requirements for fireproof or mill construction are not complied with. No joist, rafter, or stud shall be less than 1⅝ inches thick. In buildings of more than one story, floor and roof joist shall not be supported by combustible stud partitions, but shall be supported by incombustible walls or partitions, or by semi-fireproof partitions (order 5112) or by columns and girders. If a bearing partition is supported by a steel girder, the portion of such girder which projects below the ceiling shall be covered with metal lath and plaster or other approved fireproofing.

For outside windows and doors see order 5201.

SECTION 4. FRAME BUILDING.

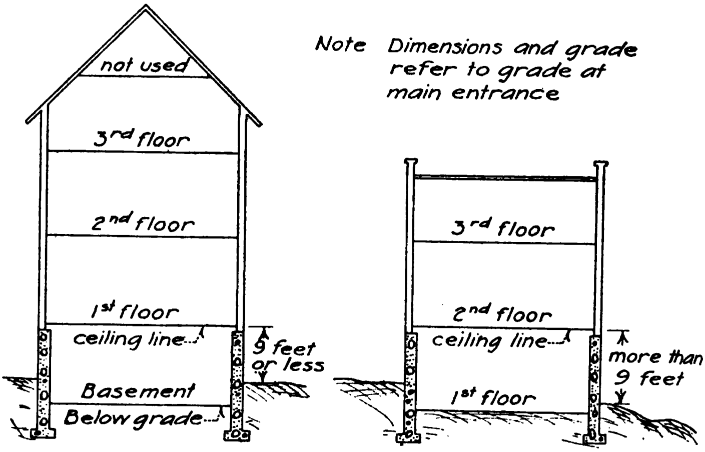
Order 5103. A frame building is a building whose structural parts and enclosing walls consist of wood. If such enclosing walls are veneered, encased or faced with stone, brick, tile, concrete, plaster or metal whose stability or rigidity depends upon the frame wall, the building is also termed a frame building.

SECTION 5. HEIGHT OF BUILDING.

Order 5104. The height of a building is measured at the center line of its principal front, from the street grade (or, if setting back from the street, from the grade of the ground adjoining the building) to the highest part of the roof, if a flat roof, or to point 2-3 the height of the roof, if a gabled or hipped roof. If the grade of the lot or adjoining street in the rear or alongside of the building falls below the grade at the front, the height shall be measured at the center of the lowest side.

SECTION 6. BASEMENT: FIRST FLOOR: NUMBER OF STORIES.

Order 5105. A basement is a story whose floorline is below the grade at the main entrance and whose ceiling is not more than 9 feet above such grade. The first floor is the floor next above the basement, or the lowest floor if there is no basement. The number of stories of a building includes all stories except the basement.



THREE STORY BUILDINGS

SECTION 7. INCOMBUSTIBLE ROOF COVERING.

Order 5106. A roof covering is considered incombustible if made of three thicknesses of roofing felt with tar and gravel, or if made of tin, corrugated iron, galvanized iron, or other approved fire resisting material.

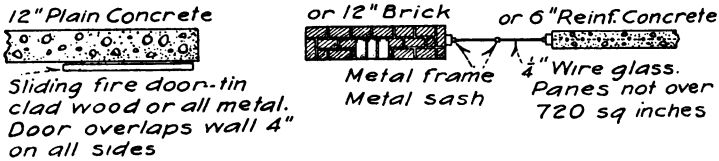
SECTION 8. STREET, ALLEY, COURT.

Order 5107. A street is any public thoroughfare 30 feet or more in width. An alley is any public thoroughfare less than 30 feet but not less than 10 feet in width. Any space less than 10 feet wide is a court.

For required size of court see order 5205.

SECTION 9. STANDARD FIRE STOPS.

Order 5108. Standard Fire Wall. A standard fire wall shall be built of brick or concrete not less than 12 inches in solid thickness, or of reinforced concrete not less than 6

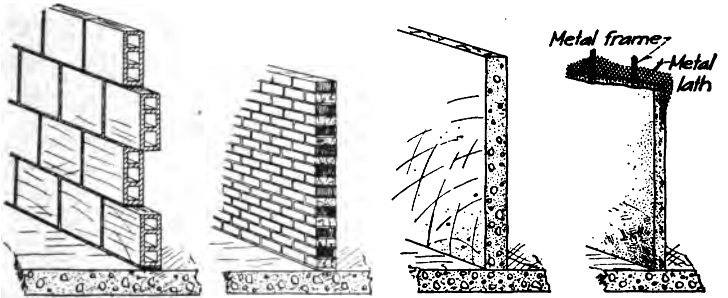

12" Plain Concrete
or 12" Brick
or 6" Reinf. Concrete
Sliding fire door-tin clad wood or all metal. Door overlaps wall 4" on all sides
Metal frame
Metal sash
¼" Wire glass. Panes not over 720 sq inches

STANDARD FIRE WALLS

inches thick. Every standard fire wall shall extend either from the foundation or from a fireproof floor, to a fireproof ceiling; or if the roof is not fireproof, such wall shall extend at least 3 feet above the highest adjoining roof line of the same building and shall be capped with stone, tile, or other indestructible material. Every opening in a standard fire wall shall be closed with a standard fire door or a fixed standard fire window.

Note. Windows in a fire wall should be avoided if possible, because even a wire glass window permits an intense radiation of heat and may melt in a hot fire. Windows are not permitted in a division wall (order 5202).

Order 5109. Standard Fireproof Enclosure or Partition. A standard fireproof enclosure or partition shall be made either of wired glass in metal frame, or solid plaster not less than 2 inches thick on metal lath and metal frame (all metal of lath and frame to be well covered), or of brick, concrete or tile of sufficient thickness to give rigidity. A standard fireproof enclosure or partition must rest on a masonry foundation or a fireproof floor, and must extend to a fireproof or semi-fireproof roof or ceiling. The wired glass in a fireproof enclosure or partition shall conform to the requirements for standard fire windows and the doors shall be standard fire doors; except that the doors may contain wired glass as specified for standard fire windows.



Hollow tile Brick Concrete 2" Solid plaster

FIRE PROOF ENCLOSURES

Note. A wired glass enclosure does not offer as high a degree of protection as the other types mentioned, because of the radiation of heat through the glass and the tendency of the exposed metal frame to buckel when heated.

Order 5110. Standard Fire Door. A standard fire door shall consist of a wooden core encased with tin, or shall be entirely of metal; and shall be of design approved by the Industrial Commission. The door frame shall be metal. The door shall close automatically in case of fire.

Order 5111. Standard Fire Window. A standard fire window shall have a metal frame, metal sash, and wired glass of design approved by the Industrial Commission. No pane shall be less than ¼ inch thick nor of greater area than 720 square inches. The window either shall be fixed or shall close automatically in case of fire.

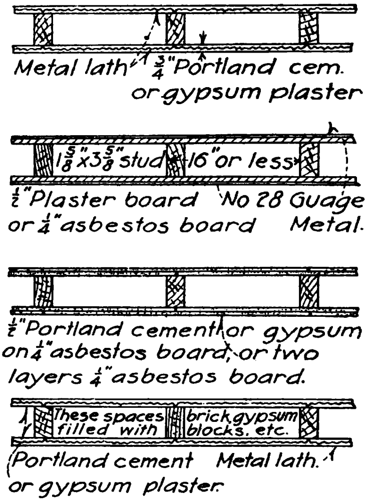
Order 5112. Semi-Fireproof Partition. A semi-fireproof partition shall be constructed of not less than 1⅝ x 3⅝ inch studding, spaced not more than 16 inches center to center, with the 3⅝ inch dimension at right angles with the plane of the wall, and having the following protection on both sides of the partition:

(1) Metal lath and at least ¾ inch of Portland cement or gypsum plaster, or gauged plaster containing one-half part lime, one-half part (or more) Portland cement, and not over four parts sand; or

(2) Good quality plaster board at least ½ inch thick, covered with sheet metal; or

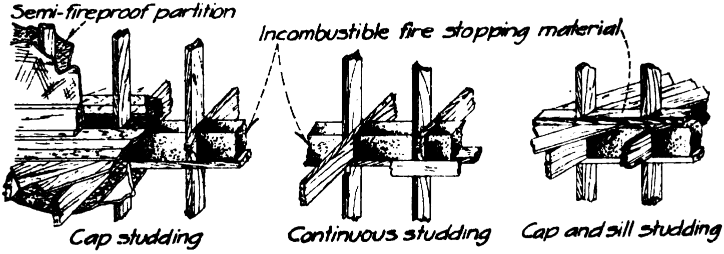
(3) ¼ inch asbestos board, covered with at least ½ inch Portland cement or gypsum plaster, or with sheet metal; or two layers of ¼ inch asbestos board breaking joints; or

(4) the spaces between studding may be filled with approved incombustible material, the partition being plastered with Portland cement or gypsum plaster on metal lath; or


Metal lath
¾" Portland cem. or gypsum plaster
1⅝" x 3⅝" stud
16" or less
½" Plaster board or ¼" asbestos board
No 28 Guage Metal.
½" Portland cement or gypsum on ¼" asbestos board, or two layers ¼" asbestos board.
These spaces filled with brick, gypsum blocks, etc.
Portland cement or gypsum plaster
Metal lath.

SEMI-FIREPROOF PARTITIONS

(5) other equivalent approved fire resisting construction. Below every hollow semi-fireproof partition, whether bearing or non-bearing, the spaces between floor joists shall be fire stopped with incombustible material extending the full height of the joists and the full thickness of the partition.



FIRE STOPPING

Every doorway in a semi-fireproof partition shall be protected with a standard fire door or with a selfclosing wooden door at least 7/8 inch thick in its thinnest part. The glass in such partitions and doors shall be wire glass.

Note. A fire door is of course much better than an unprotected wooden door. Many types of ornamental fire doors are now on the market. Wooden doors if used should perferably be at least 1½ inches thick.

Order 5113. Semi-Fireproof Ceiling. A semi-fireproof ceiling shall be constructed of not less than 1⅝ inch joists, spaced not more than 16 inches center to center, protected on the under side the same as specified for a semi-fireproof partition (order 5112); but gypsum plaster shall not be used for basement ceilings. The spaces between the joists shall be fire stopped, at intervals not greater than 25 feet, with incombustible material extending the full height of the joists.

Order 5114. Combustible Partitions or Ceiling. Every partition, ceiling or wall which is not fireproof or semifireproof is considered combustible.

SECTION 10. STAIRWAYS.

Note. Sections 10, 11, and 12 contain specifications for various types of exits (means of ingress and egress).

Exits may be classified as follows:

(1) Stair Exits:
  Exterior enclosed stairway, or smoke proof tower.
  Interior enclosed stairway.
(2) Horizontal Exits.

The foregoing types of exits are now generally agreed to be the most efficient. Enclosed stair shafts, and fireproof dividing partitions prevent the spread of fire and protect both life and property. The exterior enclosed stairway, or smoke proof tower, is the safest possible form of stair exit and also furnishes a protected position from which firemen can attack a fire on any floor.

The following types of exits have a limited value and are permitted under certain conditions:

(3) Open or unenclosed stairways:
  Interior.
  Exterior.
(4) Fire escapes:
  "A" fire escapes.
  "B" fire escapes.

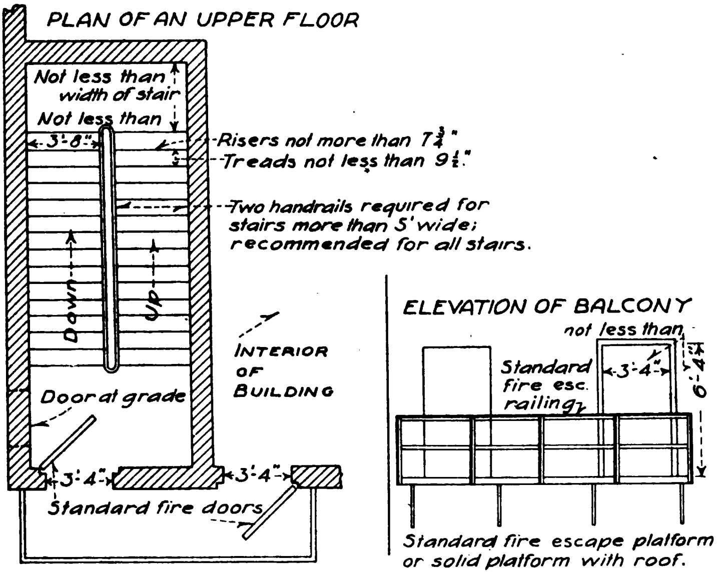
Unenclosed stairways and outside fire escapes are not reliable for the protection of life, except in low buildings, and are no protection for property.

To secure the best possible fire protection in a building accommodating a considerable number of persons, the building should be divided by a fireproof wall or partition, the two sections being connected by horizontal exits through or around the dividing wall, and each section being provided with one or more enclosed stairways; one stairway should be an exterior enclosed stairway, if possible. In case of fire in one section of such a building, the occupants can escape by the horizontal exits to the other section, and thence leave the building by means of the stairways without panic. The same protection can be secured in the case of two adjoining buildings, by connecting the two buildings with horizontal exits, each building being provided with one or more enclosed stairways. Where only a moderate number of persons are accommodated, the dividing partition is not so essential, but the stairways should be enclosed.

Fire drills are of great value in lessening the danger of panic and loss of life.

For the number, size, type and location of exits in buildings of various classes, see the orders on exits in Parts V to VIII (orders 5401—5, 5507—12, 5606—7, 5710—12.)

Order 5115. Exterior Enclosed Stairway. (Smoke Proof Tower). An exterior enclosed stairway shall be an enclosed stairway which is entirely cut off from the building and which is reached by means of open balconies or platforms. The entire stair enclosure, stairway balconies and balcony railings shall be made of incombustible material throughout. The wall separating the stairway from the building shall not be pierced by any door, window, or other opening. In a fireproof building this wall shall be built as prescribed for a standard fireproof enclosure (order 5109) but without glass; in a non-fireproof building, this wall shall be built as prescribed for an outside wall (orders 5304–5311). The doors leading from the buildings

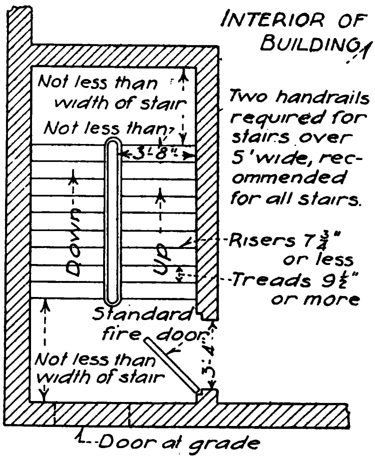


EXTERIOR ENCLOSED STAIR

to the balconies and from the balconies to the stairways shall be standard fire doors, and all openings within 10 feet of any balcony shall be protected with standard fire windows or standard fire doors. Each balcony shall be covered at the top and shall be open on at least one side, with a railing on all open sides not less than 3 feet high. See orders 5117–5119.

Order 5116. Interior Enclosed Stairway. An interior enclosed stairway shall be completely enclosed with a standard fireproof enclosure (order 5109); except that in buildings of not more than three stories, such stairways may be enclosed with semi-fireproof partitions (order 5112). In theaters and assembly halls, the door at the top of the stairway may be omitted.

The enclosure shall include at each floor level a portion of such floor which shall be at least as wide as the stairway; and such enclosure shall also include the passageway (if any) leading from the stairway to an outside door; so as to afford uninterrupted passage from the uppermost floor to such outside door, without leaving the enclosure. If windows are placed in such enclosure (excepting in the outside wall), such windows shall be fixed.


INTERIOR OF BUILDING
Not less than width of stair
Not less than
3'-8"
Two handrails required for stairs over 5' wide, recommended for all stairs.
Down
Up
Risers 7¾" or less
Treads 9½" or more
Standard fire door
3'-4"
Not less than width of stair
Door at grade

INTERIOR ENCLOSED STAIR

Note. Such windows permit an intense radiation of heat and should be avoided if possible. Where unavoidable, they should be placed at least six feet above the stairs or platforms.

See also the following orders:

Order 5117. All Stair Exits: Width. Every required stairway, whether enclosed or not, shall be at least 3 feet 8 inches wide, of which not more than 4 inches on each side may be occupied by a handrail. Every platform shall

be at least as wide as the stairway, measuring at right angles to the direction of travel. Every straight-run platform shall measure at least 3 feet in the direction of travel. Wherever a door opens onto a stairway, a platform shall be provided extending the full width of the door.

The width of any stairway shall be the clear distance between walls or stringers, of which not more than 4 inches on each side may be occupied by a handrail.

Note. If other stairways are provided in addition to those required by this code, such additional stairways need not conform to this order.

Order 5118. All Stair Exits: Handrails. All stairways and steps of more than three risers shall have at least one handrail. Stairways and steps 5 feet or more in width, or open on both sides, shall have a handrail on each side. Stairways which are required to be more than 8 feet wide shall be divided by center rails into widths not more than 8 feet nor less than 3 feet 8 inches. Center rails shall have upper newel post at least 5 feet 6 inches high, or rail may be turned down to the floor in a manner to prevent hindrance. Rails shall be not less than 2 feet 6 inches vertically above nose of treads or 3 feet above platform.

For theaters and assembly halls, see also order 5509.

Note. In railroad stations, etc., where large crowds are handled, good results have been obtained by providing intermediate handrails from 26 to 34 inches apart.

Order 5119. All Stair Exits: Risers and Treads. All stairways and steps used by the public or by more than 20 persons, shall have a uniform rise of not more than 7¾ inches and a uniform tread of not less than 9½ inches, measuring from tread to tread, and from riser to riser; no winders shall be used; there shall not be more than 18 risers between platforms or between floor and platform or not more than 22 risers from floor to floor with no platform; in stairs used by the public (theaters, public assembly halls, retail stores, schools, hotels, and similar buildings) there shall not be less than 3 risers between platforms or between floor and platform. Stairways or steps not used by the public or by more than 20 persons, shall have a uniform rise of not more than 8 inches and a uniform tread of not less than 9 inches; if winders are used, the tread

shall be at least 7 inches wide at a point one foot from the narrow end.

The edges of all treads, and the edges of stairway landings must be finished with a non-slippery surface.

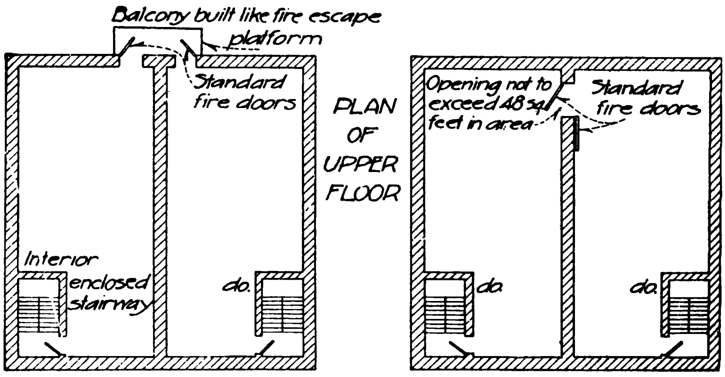
For theaters and public assembly halls, see also order 5509.

SECTION 11. HORIZONTAL EXITS.

Order 5120. A horizontal exit shall be either

(1) An opening through a fireproof wall or partition (order 5109) which separates two buildings or two divisions of a building; every such opening shall be protected by a standard fire door on each side of the wall, and the door on one side shall be self-closing; the opening shall not exceed 48 square feet in area; or

(2) An exterior balcony or bridge which connects two buildings or two divisions of a building. Every such balcony or bridge, including its railings, its supporting brackets or beams, and the exits thereto, shall be constructed the same as specified for fire escapes, (orders 5122—5125, 5128). The floor shall not have a slope of more than one foot in five. All doors and windows which open onto the balcony or bridge, or which are within 10 feet of the same, shall be standard fire doors or standard fire windows; but


Balcony built like fire escape platform
Standard fire doors
Interior enclosed stairway
do.
PLAN OF UPPER FLOOR
Opening not to exceed 48 sq. feet in area
Standard fire doors
do.
do.

Exterior Balcony Opening in division wall
HORIZONTAL EXITS

such doors and windows are in walls which are in the ame plane, then this requirement shall apply only to those oors and windows which are within 5 feet of the dividing wall.

If a horizontal exit takes the place of an "A" standard fire escape, it shall be at least 2 feet 4 inches wide; if it takes the place of a "B" standard fire escape, it shall be at least 3 feet 4 inches wide.

The floor on each side of a horizontal exit shall contain at least 3 square feet of unobstructed floor space per person, for all persons accommodated on both sides of such exit; and shall contain at least one stairway.

See also order 5132.

SECTION 12. FIRE ESCAPES.

Note. For the number, size, and location of fire escapes on new buildings of various classes, see the orders on exits in Parts V to VIII (orders 5401—5, 5507—12, 5606—7, 5710—12).

For fire escapes on existing buildings, see the General Orders on Existing Buildings.

The following orders define two sizes of fire escapes, called "A" and "B" Where not otherwise stated, the orders apply to both sizes.

Order 5121. Location. Every fire escape shall be so located as to lead directly to a street, alley, or open court connected with a street.

Every fire escape shall be placed against a blank wall if possible. If such a location is not possible, then every wall opening which is less than 6 feet distant from any riser of the fire escape shall be protected by a standard fire door or standard fire window, except in the top story, and excepting two story buildings other than theaters and assembly halls.

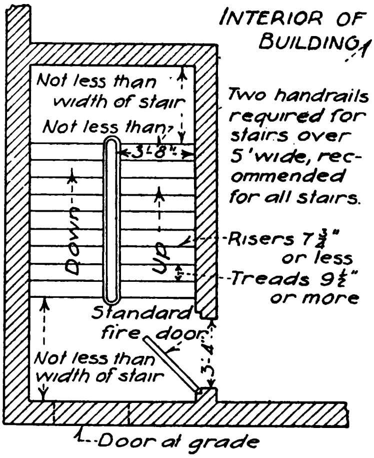
Order 5122. Exits to fire escapes. Every fire escape shall be accessible from a public passageway or shall be directly accessible from each occupied room. Exits to fire escapes shall be standard exit doors (order 5132) except that doors to "A" fire escapes may be not less than 2 feet 6 inches wide.

Order 5123. Material and Strength. No other material than wrought iron or soft or medium steel shall be used

to the balconies and from the balconies to the stairways shall be standard fire doors, and all openings within 10 feet of any balcony shall be protected with standard fire windows or standard fire doors. Each balcony shall be covered at the top and shall be open on at least one side, with a railing on all open sides not less than 3 feet high. See orders 5117–5119.

Order 5116. Interior Enclosed Stairway. An interior enclosed stairway shall be completely enclosed with a standard fireproof enclosure (order 5109); except that in buildings of not more than three stories, such stairways may be enclosed with semi-fireproof partitions (order 5112). In theaters and assembly halls, the door at the top of the stairway may be omitted.

The enclosure shall include at each floor level a portion of such floor which shall be at least as wide as the stairway; and such enclosure shall also include the passageway (if any) leading from the stairway to an outside door; so as to afford uninterrupted passage from the uppermost floor to such outside door, without leaving the enclosure. If windows are placed in such enclosure (excepting in the outside wall), such windows shall be fixed.


INTERIOR OF BUILDING
Not less than width of stair
Not less than 3'-8"
Two handrails required for stairs over 5' wide, recommended for all stairs.
DOWN
UP
Risers 7¾" or less
Treads 9½" or more
Standard fire door
Not less than width of stair
3'-4"
Door at grade

INTERIOR ENCLOSED STAIR

Note. Such windows permit an intense radiation of heat and should be avoided if possible. Where unavoidable, they should be placed at least six feet above the stairs or platforms.

See also the following orders:

Order 5117. All Stair Exits: Width. Every required stairway, whether enclosed or not, shall be at least 3 feet 8 inches wide, of which not more than 4 inches on each side may be occupied by a handrail. Every platform shall

be at least as wide as the stairway, measuring at right angles to the direction of travel. Every straight-run platform shall measure at least 3 feet in the direction of travel. Wherever a door opens onto a stairway, a platform shall be provided extending the full width of the door.

The width of any stairway shall be the clear distance between walls or stringers, of which not more than 4 inches on each side may be occupied by a handrail.

Note. If other stairways are provided in addition to those required by this code, such additional stairways need not conform to this order.

Order 5118. All Stair Exits: Handrails. All stairways and steps of more than three risers shall have at least one handrail. Stairways and steps 5 feet or more in width, or open on both sides, shall have a handrail on each side. Stairways which are required to be more than 8 feet wide shall be divided by center rails into widths not more than 8 feet nor less than 3 feet 8 inches. Center rails shall have upper newel post at least 5 feet 6 inches high, or rail may be turned down to the floor in a manner to prevent hindrance. Rails shall be not less than 2 feet 6 inches vertically above nose of treads or 3 feet above platform.

For theaters and assembly halls, see also order 5509.

Note. In railroad stations, etc., where large crowds are handled, good results have been obtained by providing intermediate handrails from 26 to 34 inches apart.

Order 5119. All Stair Exits: Risers and Treads. All stairways and steps used by the public or by more than 20 persons, shall have a uniform rise of not more than 7¾ inches and a uniform tread of not less than 9½ inches, measuring from tread to tread, and from riser to riser; no winders shall be used; there shall not be more than 18 risers between platforms or between floor and platform or not more than 22 risers from floor to floor with no platform; in stairs used by the public (theaters, public assembly halls, retail stores, schools, hotels, and similar buildings) there shall not be less than 3 risers between platforms or between floor and platform. Stairways or steps not used by the public or by more than 20 persons, shall have a uniform rise of not more than 8 inches and a uniform tread of not less than 9 inches; if winders are used, the tread

shall be at least 7 inches wide at a point one foot from the narrow end.

The edges of all treads, and the edges of stairway landings must be finished with a non-slippery surface.

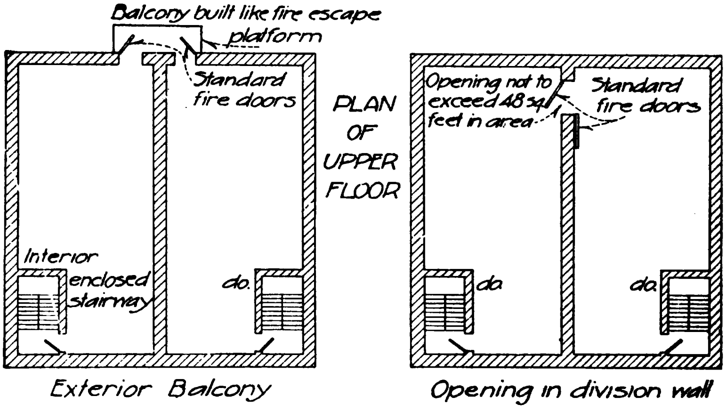
For theaters and public assembly halls, see also order 5509.

SECTION 11. HORIZONTAL EXITS.

Order 5120. A horizontal exit shall be either

(1) An opening through a fireproof wall or partition (order 5109) which separates two buildings or two divisions of a building; every such opening shall be protected by a standard fire door on each side of the wall, and the door on one side shall be self-closing; the opening shall not exceed 48 square feet in area; or

(2) An exterior balcony or bridge which connects two buildings or two divisions of a building. Every such balcony or bridge, including its railings, its supporting brackets or beams, and the exits thereto, shall be constructed the same as specified for fire escapes, (orders 5122—5125, 5128). The floor shall not have a slope of more than one foot in five. All doors and windows which open onto the balcony or bridge, or which are within 10 feet of the same, shall be standard fire doors or standard fire windows; but


Balcony built like fire escape platform
Standard fire doors
Interior enclosed stairway
do.
PLAN OF UPPER FLOOR
Opening not to exceed 48 sq. feet in area
Standard fire doors
do.
do.

Exterior Balcony　　Opening in division wall

HORIZONTAL EXITS

if such doors and windows are in walls which are in the same plane, then this requirement shall apply only to those doors and windows which are within 5 feet of the dividing wall.

If a horizontal exit takes the place of an "A" standard fire escape, it shall be at least 2 feet 4 inches wide; if it takes the place of a "B" standard fire escape, it shall be at least 3 feet 4 inches wide.

The floor on each side of a horizontal exit shall contain at least 3 square feet of unobstructed floor space per person, for all persons accommodated on both sides of such exit; and shall contain at least one stairway.

See also order 5132.

SECTION 12. FIRE ESCAPES.

Note. For the number, size, and location of fire escapes on new buildings of various classes, see the orders on exits in Parts V to VIII (orders 5401—5, 5507—12, 5606—7, 5710—12).

For fire escapes on existing buildings, see the General Orders on Existing Buildings.

The following orders define two sizes of fire escapes, called "A" and "B" Where not otherwise stated, the orders apply to both sizes.

Order 5121. Location. Every fire escape shall be so located as to lead directly to a street, alley, or open court connected with a street.

Every fire escape shall be placed against a blank wall if possible. If such a location is not possible, then every wall opening which is less than 6 feet distant from any riser of the fire escape shall be protected by a standard fire door or standard fire window, except in the top story, and excepting two story buildings other than theaters and assembly halls.

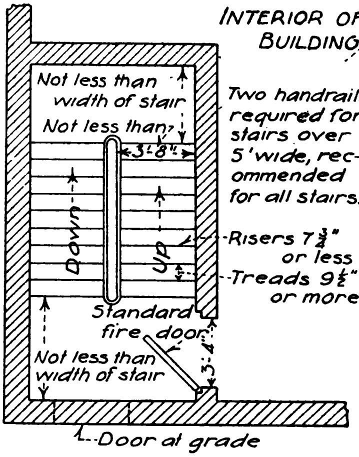
Order 5122. Exits to fire escapes. Every fire escape shall be accessible from a public passageway or shall be directly accessible from each occupied room. Exits to fire escapes shall be standard exit doors (order 5132) except that doors to "A" fire escapes may be not less than 2 feet 6 inches wide.

Order 5123. Material and Strength. No other material than wrought iron or soft or medium steel shall be used

to the balconies and from the balconies to the stairways shall be standard fire doors, and all openings within 10 feet of any balcony shall be protected with standard fire windows or standard fire doors. Each balcony shall be covered at the top and shall be open on at least one side, with a railing on all open sides not less than 3 feet high. See orders 5117–5119.

Order 5116. Interior Enclosed Stairway. An interior enclosed stairway shall be completely enclosed with a standard fireproof enclosure (order 5109); except that in buildings of not more than three stories, such stairways may be enclosed with semi-fireproof partitions (order 5112). In theaters and assembly halls, the door at the top of the stairway may be omitted.

The enclosure shall include at each floor level a portion of such floor which shall be at least as wide as the stairway; and such enclosure shall also include the passageway (if any) leading from the stairway to an outside door; so as to afford uninterrupted passage from the uppermost floor to such outside door, without leaving the enclosure. If windows are placed in such enclosure (excepting in the outside wall), such windows shall be fixed.


INTERIOR OF BUILDING
Not less than width of stair
Not less than
3'-8"
Two handrails required for stairs over 5' wide, recommended for all stairs.
Down
Up
Risers 7¾" or less
Treads 9½" or more
Standard fire door
3'-4"
Not less than width of stair
Door at grade

INTERIOR ENCLOSED STAIR

Note. Such windows permit an intense radiation of heat and should be avoided if possible. Where unavoidable, they should be placed at least six feet above the stairs or platforms.

See also the following orders:

Order 5117. All Stair Exits: Width. Every required stairway, whether enclosed or not, shall be at least 3 feet 8 inches wide, of which not more than 4 inches on each side may be occupied by a handrail. Every platform shall

be at least as wide as the stairway, measuring at right angles to the direction of travel. Every straight-run platform shall measure at least 3 feet in the direction of travel. Wherever a door opens onto a stairway, a platform shall be provided extending the full width of the door.

The width of any stairway shall be the clear distance between walls or stringers, of which not more than 4 inches on each side may be occupied by a handrail.

Note. If other stairways are provided in addition to those required by this code, such additional stairways need not conform to this order.

Order 5118. All Stair Exits: Handrails. All stairways and steps of more than three risers shall have at least one handrail. Stairways and steps 5 feet or more in width, or open on both sides, shall have a handrail on each side. Stairways which are required to be more than 8 feet wide shall be divided by center rails into widths not more than 8 feet nor less than 3 feet 8 inches. Center rails shall have upper newel post at least 5 feet 6 inches high, or rail may be turned down to the floor in a manner to prevent hindrance. Rails shall be not less than 2 feet 6 inches vertically above nose of treads or 3 feet above platform.

For theaters and assembly halls, see also order 5509.

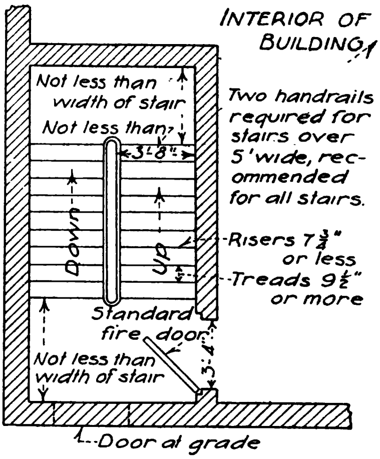
Note. In railroad stations, etc., where large crowds are handled, good results have been obtained by providing intermediate handrails from 26 to 34 inches apart.

Order 5119. All Stair Exits: Risers and Treads. All stairways and steps used by the public or by more than 20 persons, shall have a uniform rise of not more than 7¾ inches and a uniform tread of not less than 9½ inches, measuring from tread to tread, and from riser to riser; no winders shall be used; there shall not be more than 18 risers between platforms or between floor and platform or not more than 22 risers from floor to floor with no platform; in stairs used by the public (theaters, public assembly halls, retail stores, schools, hotels, and similar buildings) there shall not be less than 3 risers between platforms or between floor and platform. Stairways or steps not used by the public or by more than 20 persons, shall have a uniform rise of not more than 8 inches and a uniform tread of not less than 9 inches; if winders are used, the tread

to the balconies and from the balconies to the stairways shall be standard fire doors, and all openings within 10 feet of any balcony shall be protected with standard fire windows or standard fire doors. Each balcony shall be covered at the top and shall be open on at least one side, with a railing on all open sides not less than 3 feet high. See orders 5117–5119.

Order 5116. Interior Enclosed Stairway. An interior enclosed stairway shall be completely enclosed with a standard fireproof enclosure (order 5109); except that in buildings of not more than three stories, such stairways may be enclosed with semi-fireproof partitions (order 5112). In theaters and assembly halls, the door at the top of the stairway may be omitted.

The enclosure shall include at each floor level a portion of such floor which shall be at least as wide as the stairway; and such enclosure shall also include the passageway (if any) leading from the stairway to an outside door; so as to afford uninterrupted passage from the uppermost floor to such outside door, without leaving the enclosure. If windows are placed in such enclosure (excepting in the outside wall), such windows shall be fixed.


INTERIOR OF BUILDING
Not less than width of stair
Not less than 3'-8"
Two handrails required for stairs over 5' wide, recommended for all stairs.
Down
Up
Risers 7¾" or less
Treads 9½" or more
Standard fire door
Not less than width of stair
3'-4"
Door at grade

INTERIOR ENCLOSED STAIR

Note. Such windows permit an intense radiation of heat and should be avoided if possible. Where unavoidable, they should be placed at least six feet above the stairs or platforms.

See also the following orders:

Order 5117. All Stair Exits: Width. Every required stairway, whether enclosed or not, shall be at least 3 feet 8 inches wide, of which not more than 4 inches on each side may be occupied by a handrail. Every platform shall

be at least as wide as the stairway, measuring at right angles to the direction of travel. Every straight-run platform shall measure at least 3 feet in the direction of travel. Wherever a door opens onto a stairway, a platform shall be provided extending the full width of the door.

The width of any stairway shall be the clear distance between walls or stringers, of which not more than 4 inches on each side may be occupied by a handrail.

Note. If other stairways are provided in addition to those required by this code, such additional stairways need not conform to this order.

Order 5118. All Stair Exits: Handrails. All stairways and steps of more than three risers shall have at least one handrail. Stairways and steps 5 feet or more in width, or open on both sides, shall have a handrail on each side. Stairways which are required to be more than 8 feet wide shall be divided by center rails into widths not more than 8 feet nor less than 3 feet 8 inches. Center rails shall have upper newel post at least 5 feet 6 inches high, or rail may be turned down to the floor in a manner to prevent hindrance. Rails shall be not less than 2 feet 6 inches vertically above nose of treads or 3 feet above platform.

For theaters and assembly halls, see also order 5509.

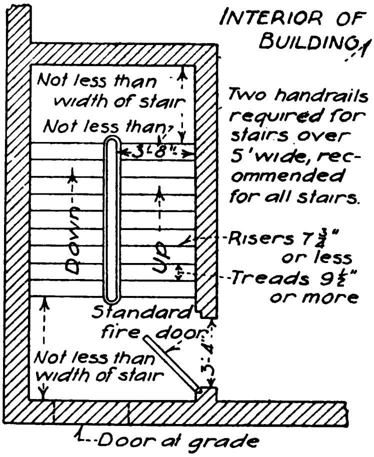
Note. In railroad stations, etc., where large crowds are handled, good results have been obtained by providing intermediate handrails from 26 to 34 inches apart.

Order 5119. All Stair Exits: Risers and Treads. All stairways and steps used by the public or by more than 20 persons, shall have a uniform rise of not more than 7¾ inches and a uniform tread of not less than 9½ inches, measuring from tread to tread, and from riser to riser; no winders shall be used; there shall not be more than 18 risers between platforms or between floor and platform or not more than 22 risers from floor to floor with no platform; in stairs used by the public (theaters, public assembly halls, retail stores, schools, hotels, and similar buildings) there shall not be less than 3 risers between platforms or between floor and platform. Stairways or steps not used by the public or by more than 20 persons, shall have a uniform rise of not more than 8 inches and a uniform tread of not less than 9 inches; if winders are used, the tread

to the balconies and from the balconies to the stairways shall be standard fire doors, and all openings within 10 feet of any balcony shall be protected with standard fire windows or standard fire doors. Each balcony shall be covered at the top and shall be open on at least one side, with a railing on all open sides not less than 3 feet high. See orders 5117–5119.

Order 5116. Interior Enclosed Stairway. An interior enclosed stairway shall be completely enclosed with a standard fireproof enclosure (order 5109); except that in buildings of not more than three stories, such stairways may be enclosed with semi-fireproof partitions (order 5112). In theaters and assembly halls, the door at the top of the stairway may be omitted.

The enclosure shall include at each floor level a portion of such floor which shall be at least as wide as the stairway; and such enclosure shall also include the passageway (if any) leading from the stairway to an outside door; so as to afford uninterrupted passage from the uppermost floor to such outside door, without leaving the enclosure. If windows are placed in such enclosure (excepting in the outside wall), such windows shall be fixed.


INTERIOR OF BUILDING
Not less than width of stair
Not less than 3'8"
Two handrails required for stairs over 5' wide, recommended for all stairs.
Down
Up
Risers 7¾" or less
Treads 9½" or more
Standard fire door
3'4"
Not less than width of stair
Door at grade

INTERIOR ENCLOSED STAIR

Note. Such windows permit an intense radiation of heat and should be avoided if possible. Where unavoidable, they should be placed at least six feet above the stairs or platforms.

See also the following orders:

Order 5117. All Stair Exits: Width. Every required stairway, whether enclosed or not, shall be at least 3 feet 8 inches wide, of which not more than 4 inches on each side may be occupied by a handrail. Every platform shall

be at least as wide as the stairway, measuri which ng at right angles to the direction of travel. Every st.s apply raight-run platform shall measure at least 3 feet in the ll direction of travel. Wherever a door opens onto a stair un 5 fee way, a platform shall be provided extending the full w width of the door.

es th

The width of any stair at way shall be the clear distance between walls or stringers, of which not more than 4 inches on each side may be occupied by a handrail.

Note. If other stairways are provided in addition to those required by this code, such additional stairways need not conform to this order.

Order 5118. All Stair Exits: Handrails. All stairways and steps of more than three risers shall have at least one handrail. Stairways and steps 5 feet or more in width, or open on both sides, shall have a handrail on each side. Stairways which are required to be more than 8 feet wide shall be divided by center rails into widths not more than 8 feet nor less than 3 feet 8 inches. Center rails shall have upper newel post at least 5 feet 6 inches high, or rail may be turned down to the floor in a manner to prevent hindrance. Rails shall be not less than 2 feet 6 inches vertically above nose of treads or 3 feet above platform.

For theaters and assembly halls, see also order 5509.

Note. In railroad stations, etc., where large crowds are handled, good results have been obtained by providing intermediate handrails from 26 to 34 inches apart.

Order 5119. All Stair Exits: Risers and Treads. All stairways and steps used by the public or by more than 20 persons, shall have a uniform rise of not more than 7¾ inches and a uniform tread of not less than 9½ inches, measuring from tread to tread, and from riser to riser; no winders shall be used; there shall not be more than 18 risers between platforms or between floor and platform or not more than 22 risers from floor to floor with no platform; in stairs used by the public (theaters, public assembly halls, retail stores, schools, hotels, and similar buildings) there shall not be less than 3 risers between platforms or between floor and platform. Stairways or steps not used by the public or by more than 20 persons, shall have a uniform rise of not more than 8 inches and a uniform tread of not less than 9 inches; if winders are used, the tread

shall be at least 7 inches wide at a point one foot from the narrow end.

The edges of all treads, and the edges of stairway landings must be finished with a non-slippery surface.

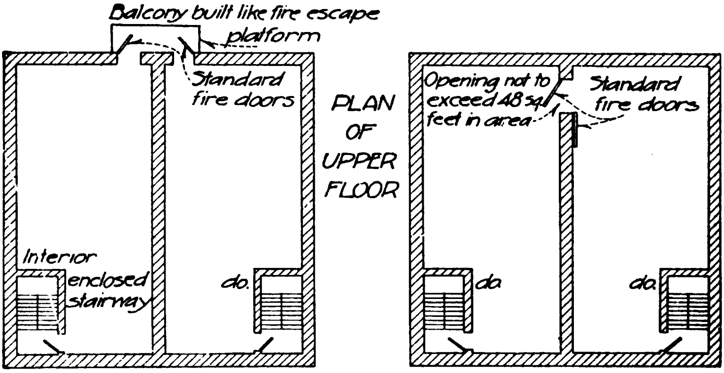
For theaters and public assembly halls, see also order 5509.

SECTION 11. HORIZONTAL EXITS.

Order 5120. A horizontal exit shall be either

(1) An opening through a fireproof wall or partition (order 5109) which separates two buildings or two divisions of a building; every such opening shall be protected by a standard fire door on each side of the wall, and the door on one side shall be self-closing; the opening shall not exceed 48 square feet in area; or

(2) An exterior balcony or bridge which connects two buildings or two divisions of a building. Every such balcony or bridge, including its railings, its supporting brackets or beams, and the exits thereto, shall be constructed the same as specified for fire escapes, (orders 5122—5125, 5128). The floor shall not have a slope of more than one foot in five. All doors and windows which open onto the balcony or bridge, or which are within 10 feet of the same, shall be standard fire doors or standard fire windows; but


Balcony built like fire escape platform
Standard fire doors
PLAN OF UPPER FLOOR
Interior enclosed stairway
do.
Opening not to exceed 48 sq. feet in area
Standard fire doors
do.
do.

Exterior Balcony Opening in division wall

HORIZONTAL EXITS

if such doors and windows are in walls which are in the same plane, then this requirement shall apply only to those doors and windows which are within 5 feet of the dividing wall.

If a horizontal exit takes the place of an "A" standard fire escape, it shall be at least 2 feet 4 inches wide; if it takes the place of a "B" standard fire escape, it shall be at least 3 feet 4 inches wide.

The floor on each side of a horizontal exit shall contain at least 3 square feet of unobstructed floor space per person, for all persons accommodated on both sides of such exit; and shall contain at least one stairway.

See also order 5132.

SECTION 12. FIRE ESCAPES.

Note. For the number, size, and location of fire escapes on new buildings of various classes, see the orders on exits in Parts V to VIII (orders 5401—5, 5507—12, 5606—7, 5710—12).

For fire escapes on existing buildings, see the General Orders on Existing Buildings.

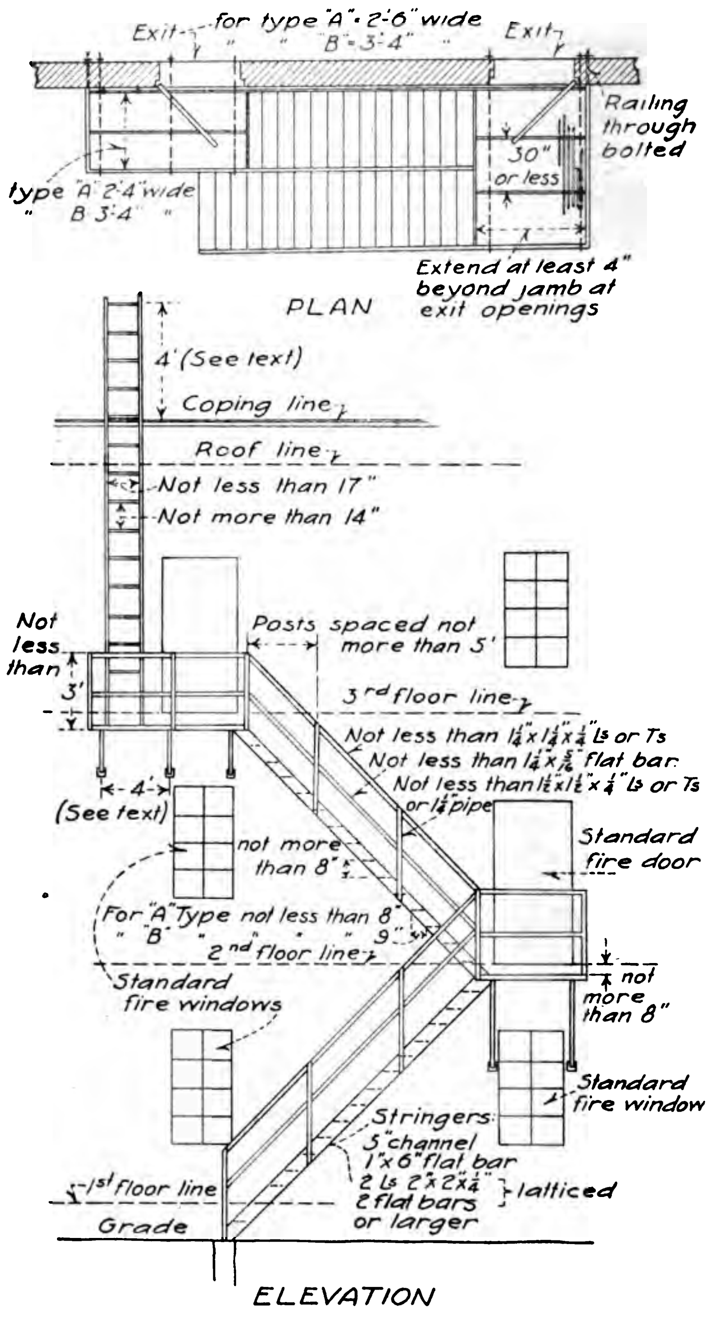
The following orders define two sizes of fire escapes, called "A" and "B" Where not otherwise stated, the orders apply to both sizes.

Order 5121. Location. Every fire escape shall be so located as to lead directly to a street, alley, or open court connected with a street.

Every fire escape shall be placed against a blank wall if possible. If such a location is not possible, then every wall opening which is less than 6 feet distant from any riser of the fire escape shall be protected by a standard fire door or standard fire window, except in the top story, and excepting two story buildings other than theaters and assembly halls.

Order 5122. Exits to fire escapes. Every fire escape shall be accessible from a public passageway or shall be directly accessible from each occupied room. Exits to fire escapes shall be standard exit doors (order 5132) except that doors to "A" fire escapes may be not less than 2 feet 6 inches wide.

Order 5123. Material and Strength. No other material than wrought iron or soft or medium steel shall be used



FIRE ESCAPES

for any part of a fire escape, except for weights, separators, and ornaments. No bar material less than ¼-inch thick shall be used in the construction of any fire escape, except for separators, ornaments, structural shapes over 3 inches and rigidly built up treads and platforms of approved design. All bolts and rivets, except for ornamental work, shall be not less than ⅜ -inch in diameter.

Each part of every fire escape (except counterweights for balanced stairways) shall be designed and constructed to carry a live load of 100 pounds per square foot of horizontal area over the entire fire escape. Each part of every fire escape shall be designed and constructed in accordance with the requirements on Structural Design (order 5316) except that the unit stresses therein specified shall be reduced by one fourth. The minimum sections and sizes specified below, shall be increased whenever necessary so that under full load the allowable unit stresses will not be exceeded.

Order 5124. Platforms. Each platform of an "A" fire escape shall be at least 28 inches wide; each platform of a "B" fire escape shall be at least 3 feet 4 inches wide. Such widths shall be the clear distance between stringers, measuring at the narrowest point. Each platform shall extend at least 4 inches beyond the jambs of exit opening. The above minimum widths and lengths shall be increased, wherever necessary, so that no exit door or window will, when open, block any part of the required width of the fire escape.

Every platform shall consist of either,

(1) Flat bars on edge, not less than 1 x ¼ inch; but not less than 1¼ x ¼ inch where bolts and separators are used; bars shall not be more than 1¼ inches center to center.

(2) ½ inch or ⅝ inch square bars with sharp edge up, not more than 1½ inches center to center.

(3) ⅝ inch round bars, not more than 1½ inches center to center.

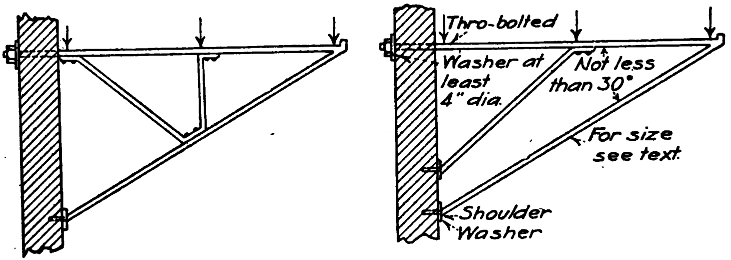
Platform and treads may be solid if covered by a roof.

The platform frame shall consist of not less than 2 x 3/8 inch flat bars on edge or equivalent, provided the brackets are not more than 4 feet apart. If brackets are more than 4 feet apart, the frame shall be correspondingly stronger and stiffer. Every platform wider than 30 inches, if made of square or round bars, shall have a third frame bar through the center; if made of flat bars, the platform shall have separators and bolts through the center. Frame bars shall not project more than 1/4 inch above platform bars, except around the outside of platform.

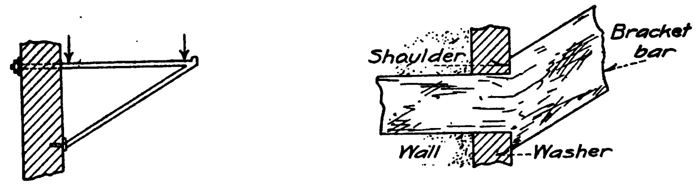
There shall be a platform at each story above the first, and intermediate platforms if floors are more than 18 feet apart vertically.

Platforms shall not be more than 8 inches below the door sill.

Order 5125. Brackets. Brackets for a 28 inch or 30 inch platform, when spaced not more than 4 feet apart, shall be made of not less than 7/8 inch square bars or 1½ x 1½ x 1/4 inch angles; such bars or angles shall be larger if the platform is wider or if the brackets are farther apart. Each bracket shall be fastened at the top to the wall by a through bolt (at least 7/8 inch diameter), nut, and washer



TWO TYPES OF TWO STAIR SUPPORT



ONE STAIR SUPPORT DETAIL OF WALL BEARING

TYPICAL FIRE ESCAPE BRACKETS

(at least 4 inch diameter). The slope of the lower bracket bar shall be not less than 30 degrees with the horizontal. The lower bar shall have a washer or shoulder to give sufficient bearing against the wall.

Note. In applying the requirements for Structural Design (order 5316) to the design of a bracket the lower bracket bar must be designed according to the column formula. According to this formula (for example), brackets made of 1 inch square wrought iron, 4 feet apart, carrying a 3 feet 4 inch platform, are just within the limit of stiffness. If the brackets were over 4 feet apart, a heavier bar or an angle would have to be used.

The strength of the wall to which brackets are to be attached shall be carefully considered in determining the spacing, shape, and inside connection of brackets, so that under full load the wall will not be unduly strained.

Order 5126. Stairways. Each stairway of an "A" fire escape shall be at least 24 inches wide between stringers; such stairway shall have a uniform rise of not more than 8 inches and a uniform run of not less than 8 inches.

Each stairway of a "B" fire escape shall be at least 3 feet 4 inches wide between stringers; such stairway shall have a uniform rise of not more than 8 inches, and a uniform run of not less than 9 inches.

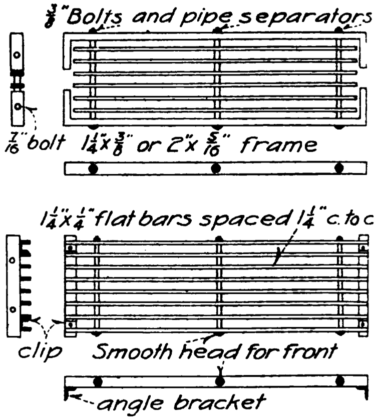
Note. The rise is the vertical distance from the extreme edge of any step to the corresponding extreme edge of the next step. The run is the horizontal distance between the same points.

Stairway stringers shall consist of either

(1) A 5 inch channel or larger.
(2) Two angles 2 x 2 x ¼ inch or larger.
(3) Two flat bars 2 x ⅜ inch or larger.
(4) One flat bar 6 x ¼ inch or larger.

If two angles or two flat bars are used, they shall be properly tied together by lattice bars, vertical as well as horizontal. If flat bars are used, every stairway of more than 10 risers shall have lateral bracing. The connection of stringers to platform, at top and bottom, shall be at least equal in strength to the stringers and shall safely carry the full live and dead loads. If stringers are carried by intermediate brackets, the stringers shall have a horizontal bearing on the brackets and shall be properly and securely connected thereto.

Treads shall consist of either flat or square bars, (not round), of the size and spacing specified for platforms. An "A" tread shall consist of at least six square bars, or seven flat bars. A "B" tread shall consist of at least seven square bars, or eight flat bars. A "B" tread made of flat bars shall have separators and bolt through the center. A "B" tread made of square bars shall be trussed.


$\frac{3}{8}$" Bolts and pipe separators
$\frac{7}{16}$" bolt
$1\frac{1}{4}$" x $\frac{3}{8}$" or 2" x $\frac{5}{16}$" frame
$1\frac{1}{4}$" x $\frac{1}{4}$" flat bars spaced $1\frac{1}{4}$" c. to c
clip
Smooth head for front
angle bracket

"B" Type Fire Escape

TYPICAL TREADS

Treads and platforms may be solid if covered by a roof.

Order 5127. Balanced Stairway. All "B" fire escapes, and all fire escapes on schools, theaters, and assembly halls, either shall reach to the ground or shall have a balanced stairway reaching to the ground. "A" fire escapes which are not on schools, theaters, or assembly halls, may terminate in a platform at least 3 feet long, located not more than 10 feet above the ground.

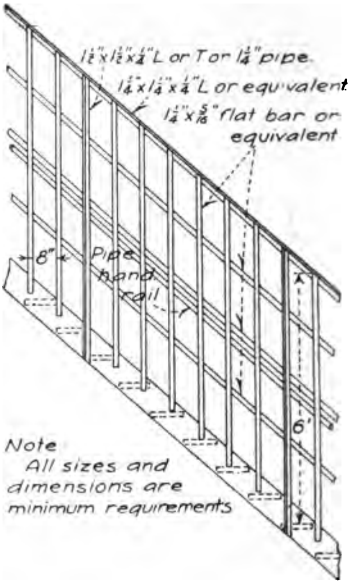
Every balanced stairway shall conform to the requirements for other stairways except that the stringers and the top rail may be lighter if they are properly trussed. The counterbalancing device shall be attached to both sides of the stairway equally, or a special attachment shall be used to prevent warping or twisting. The counterbalancing device shall operate gradually and easily as the live load is applied. Cable counterweights are not permitted.

Treads for "A" balanced stairways may be made as follows: two 1¼ x 1¼ x ¼ inch angles at front and back; two 1¼ x ¼ inch bars between, lying flatwise; one inch space between bars. Treads for "B" balanced stairways may be made as follows: two 1½ x 1½ x ¼ inch angles at front and back; two 1½ x ¼ inch bars between, lying flatwise; one inch space between bars. All such treads shall be strongly fastened together with cross bars not more than 14 inches apart.

Order 5128. Railings. Railings shall be provided on all open sides of platforms and stairways, and on both sides of balanced stairways. Either a railing or a handrail fastened to wall shall be provided on each side of all "B" fire escape stairways. Railings shall be at least 3 feet high, measuring vertically from floor of platform or from nose of step.

Every railing shall have posts, not more than 5 feet apart made of not less than 1½ x 1½ x ¼ inch angles or tees, or 1¼ inch pipe; top rail not less than 1¼ x 1¼ x ¼ inch angle or equivalent; center rail not less than 1¼ x 5-16 flat bar or equivalent. All connections shall be such as to make the railing stiff; two bolts (⅜ inch or larger) shall be used at the foot of each post wherever possible, or at least one ½-inch bolt shall be used. Railings shall be continuous. No projections on the inside of the railing shall be permitted. Where a railing returns to the wall, it shall be fastened thereto with a through bolt (at least ⅝ inch diameter), nut, and washer; or (in reinforced concrete) with an approved insert; or the railing shall be made equally secure with a diagonal brace extending at least 3 feet horizontally and 3 feet vertically.

All outside railings which are more than 60 feet above grade shall be at least 6 feet high, measuring vertically from floor of platform or from nose of step. Such railings shall be of special design approved by the Industrial Commission, having not less than four longitudinal rails, and veritical lattice bars not more than eight inches apart, and proper stiffening braces or brackets.


1½"x1½"x¼" L or T or 1¼" pipe
1¼"x1¼"x¼" L or equivalent
1¼"x5/16" flat bar or equivalent
8"
Pipe hand rail
6'
Note
All sizes and dimensions are minimum requirements

RAILING FOR HIGH BUILDINGS

Order 5129. Ladder to Roof. Every fire escape which extends higher than the second floor shall be provided with a ladder leading from the upper platform to the roof, unless the fire escape stairway leads to the roof. The ladder shall have stringers not less than 1¼ inch pipe, or not less than 2 x ⅜ inch flat bars, at least 17 inches apart in the clear. The rungs shall be not less than ½ inch square or ⅝ inch round bars, 14 inches center to center. The stringers shall be securely tied together at intervals no greater than every fifth rung. The top rung of each ladder shall be not less than 4 feet above the roof coping, and the ladder shall return within 2 feet of the roof if the coping is more than 2 feet above the roof.

Order 5130. Standpipe. A standpipe shall be attached to every fire escape on every building of more than three stories not having an automatic sprinkler system; except that buildings requiring more than one fire escape on any side thereof, shall be provided with at least one standpipe on each side.

Every standpipe shall extend from a point within 5 feet of the ground to a point 3 feet above the roof or cornice, and shall be securely fastened to and accessible from each platform. The standpipe shall be made of not less than 3 inch wrought pipe, with 2½ inch outlet hose valve at each floor and at roof, and a double Siamese valve at the base of the pipe. All connections shall conform to the size and pattern used by the local fire department, and the entire standpipe shall conform to all requirements of such department.

Order 5131. Other Types of Fire Escapes. Sliding or chute fire escapes may be used, upon the approval of the Industrial Commission in place of "A" or "B" fire escapes. Every sliding fire escape shall be provided with a ladder constructed as in order 5129, extending from 5 feet above grade, to 4 feet above the roof coping.

SECTION 13. STANDARD EXIT DOORS.

Order 5132. Every door which serves as a required exit from a public passageway or stairway, or which forms a horizontal exit, shall be a standard exit door. See also orders 5406, 5511, 5608, 5713.

Every standard exit door shall swing outward or toward the natural means of egress (except as below and as in orders 5406, 5713). It shall be level with the floor, and shall be so hung that, when open, it will not block any part of the required width of any other doorway, passageway, stairway, or fire escape. No revolving door, (unless collapsible) and no sliding door, except where it opens onto a stairway enclosure, or serves as a horizontal exit shall be considered as a standard exit door.

Note. Where revolving doors are used, it is recommended that swinging doors also be provided.

For doorways opening into a stairway enclosure, swinging doors are recommended, especially where used by more than 20 persons.

A standard exit door shall have such fastenings or hardware that it can be opened from the inside without using a key, by pushing against a single bar or plate, or turning a single knob or handle; it shall not be locked, barred, or bolted at any time while the building is occupied.

Note. For theaters, schools, large factories and hotels, etc., the "panic bolt" which operates by pressure against a bar or plate is recommended.

A standard exit doorway shall not be less than 6 feet 4 inches high by 3 feet 4 inches wide, except where especially provided (orders 5608, 5713). No such doorway or group of doorways shall be more than 6 inches narrower than the required width of the stairway or passageway leading thereto.

In every building which is used at night, a red exit light shall be placed over every emergency exit door and also over every exit door where other doors or openings may cause confusion. (See also orders 5406, 5530, 5715).

SECTION 14. LOCATION AND MAINTENANCE OF EXITS.

Order 5133. Every exit mentioned in orders 5115-5132 shall lead to a street, alley or open court connected with a street. All such exits, and all passageways leading to and from the same, shall be kept in good repair and unobstructed at all times.

SECTION 15. STANDPIPES, FIRE EXTINGUISHERS, AND SPRINKLERS.

For exterior standpipes see order 5130.

Order 5134. Interior Standpipes. For the number and location of interior standpipes required in buildings of various classes, see the sections on standpipes in Parts V to VIII (orders 5411, 5533, 5621, 5726).

Standpipes shall connect with city water mains or with an elevated tank of approved design and capacity, and shall be provided with hose and valve at each story, located not more than 5 feet above the floor.

The hose shall be not less than 1½ inches in diameter, and shall be kept connected, in good repair and working order, and ready for immediate use at all times.

Note. Unlined hose is recommended in buildings where such hose will not be used except in a rare emergency. Unlined hose is cheaper and does not deteriorate so rapidly. It is not suitable for continuous or frequent use.

The size of pipes and other details of installation, shall be as approved by the Industrial Commission.

An approved automatic sprinkler system will be accepted as a substitute for interior standpipes, except in theatres (orders 5533, 5535).

Note. The Industrial Commission will ordinarily approve any sprinkler or standpipe installation which is approved by the Underwriters.

Order 5135. Fire extinguishers. Where chemical fire extinguishers are required, they shall be of the 2½ gallon soda-acid type, or other type approved by the Industrial Commission. Soda-acid extinguishers shall be discharged and recharged at least once a year; others shall be charged as required.

Note. The Industrial Commission will ordinarily approve any extinguisher which bears the Underwriters' label. For the type best adapted to any particular situation, consult the local Fire Chief, or Underwriters, or the Industrial Commission.

Order 5136. Automatic Sprinklers. Where an automatic sprinkler system is required throughout the building (orders 5412, 5535), such system shall be supplied either from the city water mains or from a gravity or pressure tank. If city water supply of adequate volume and pressure is not available, a tank shall be provided.

Where automatic sprinklers are required in the basement only (order 5412), they shall be supplied from the city water mains. If there is no city water supply, such basement sprinklers will not be required. If in the future a city supply becomes available, then the basement sprinklers shall be installed.

Every basement sprinkler system shall also include sprinklers in all shafts (except elevator shafts) leading upward from the basement.

Every sprinkler system shall also have a suitable connection for the fire department. Where a complete sprinkler system is provided (whether required or not) exterior and interior standpipes may be omitted, except for interior standpipes in theaters. The number and location of sprinklers, size of pipes, size and location of tank (if any), and all other details of equipment, shall conform to the best standard practice.

Note. The Industrial Commission will ordinarily approve any sprinkler system which is approved by the Wisconsin Inspection Bureau.

The commission reserves the right to order a sprinkler system in any building, regardless of its height or number of persons, if the occupancy is especially hazardous.

Automatic sprinklers probably give the best fire protection for the least cost, for both life and property. They are recommended for use in hotels throughout the building, in basements of schools, public halls and theaters, and in most mercantile and factory buildings.

Explanatory

The word "approved," as used in defining the foregoing standards, or in any other part of this code, means "approved by the Industrial Commission"; and any other discretionary power required or implied by any part of this code, lies with the Industrial Commission.

Part III

GENERAL REQUIREMENTS

Note. For general requirements on stairways, doors, fire escapes, standpipes, etc., see the definition of these terms, orders 5115—5136.

SECTION 1. DESIGN AND SUPERVISION OF BUILDINGS.

Order 5200. Every building shall be designed by a competent architect, engineer, or builder, in accordance with this code; and shall be constructed under the supervision of a competent superintendent or inspector, in accordance with the plans and specifications of the designer. The designer may also act as superintendent. No material change from the original plans and specifications shall be made except with the knowledge and consent of the designer. No owner shall construct any building or permit any building to be constructed except in accordance with this section.

Note. By the term "architect" above is meant "registered architect". The statutes contain the provision that "no person doing business in this state shall use the term "architect" as a part of his business name or title, or in any way represent himself to be an architect, without a certificate of registration." This does not prohibit a contractor or builder from drawing plans provided he does not term himself an architect in any way.

SECTION 2. HEIGHT AND CLASS OF CONSTRUCTION.

Order 5201. See also orders 5502—3, 5602, 5702—3. In a fire proof building exceeding 160 feet in height, all stairway and corridor windows and doors shall be standard fire windows and standard fire doors, except that the doors may contain glass as specified for standard fire windows. The stairway and corridor finish and floors shall be made entirely of incombustible material.

Note. See Chapter 343, Section 4444f of the Wisconsin Statutes for statute law regulating heighth of buildings throughout the state of Wisconsin. This law supercedes conflicting portions of the preceding paragraph of Order 5201.

Buildings of mill construction shall not be higher than 85 feet above the grade.

Buildings of ordinary construction shall not be higher than 60 feet above the grade.

Frame or veneered buildings shall not be higher than 40 feet above the grade.

Roof appendages such as dormer windows, domes, towers, tanks, other than sprinkler tanks, turrets, spires, skylights, monitors, penthouses or other projections above the main roof of a building shall not exceed in total area 20 per cent of the main roof, otherwise the building height limit shall apply to the roof of such appendage.

No appendage, except sprinkler tanks, on the roof of a building of mill construction shall exceed a height of 110 feet above the grade.

No appendage, except sprinkler tanks, on the roof of a building of ordinary construction shall exceed a height of 80 feet above the grade.

No appendage, except sprinkler tanks, on the roof of any frame or veneered building shall exceed a height of 50 feet above the grade; the walls and roof of all such appendages shall be covered with incombustible material.

A spire which does not exceed in total area 20 per cent of the main roof will be excepted from the above limitations of height provided the following requirements are met with:

(1) The spire must be supported by masonry foundations and walls designed to support it independent of the rest of the building.

(2) The masonry wall of the spire must extend at least as high as the ridge of the roof of the main building.

(3) The spire must be protected against lightning.

Penthouses containing elevator machinery shall be constructed as required by the Elevator Code issued by the Industrial Commission.

In every building more than four stories in height, all outside doors and windows shall be standard fire doors and standard fire windows, if they are less than 15 feet away from any adjoining lot line or from the center of an adjoining alley, or if they are less than 30 feet away from any other building; but this shall not apply to walls, windows and doors which lie in the same or parallel planes facing in the same direction.

Note. The Industrial Commission reserves the right to require fire doors and windows in any building where the hazard is great.

Any portion of a building which is of inferior type of construction or which is exposed to special fire hazard, shall be isolated by means of standard fire walls or fireproof enclosure, or partitions, and fire-resisting ceilings, floors and doors, or as directed by the Industrial Commission.

SECTION 3. FLOOR AREAS.

Order 5202. The maximum undivided floor area in any building more than one story in height shall be as follows:

Fireproof construction	18,000 square feet
Mill construction	10,000 square feet
Ordinary construction	7,500 square feet
Frame buildings	5,000 square feet

The areas in the foregoing table may be increased as follows:

In two-story buildings, by 50 per cent.

In frame buildings, and in buildings of ordinary and mill construction, equipped with an approved automatic sprinkler system, by 66 2-3 per cent. In buildings of fire-proof construction, equipped with an approved automatic sprinkler system by 50 per cent.

In buildings fronting on at least three streets, or two streets and an alley, by 20 per cent.

Every such increase shall be computed on the original maximum area. The increases are cumulative. The above limits of area for two-story buildings shall also apply to one-story buildings within the corporate limits of any city or village, except that where both the building and its contents are practically incombustible such area may be increased if approved in writing by the Industrial Commission.

Where a dividing wall is required in any building such wall shall be of solid incombustible fire resisting material of the same thickness as required for enclosing walls (orders 5304—5310); and shall be continuous from the foundation to the roof, in a fireproof building, or to 3 feet above the roof in a non-fireproof building. Each opening in a division wall shall have a standard fire door on each side of the wall.

SECTION 4. WINDOWS AND COURTS.

Order 5203. Windows. Every room in which one or more persons live, sleep, or are employed, (except storage rooms or other rooms where the nature of the occupancy will not permit) shall be lighted by a window or windows opening directly upon street or alley or upon a court on the same lot with the building. The windows shall be so constructed and distributed as to afford proper light and ventilation. Every building more than 40 feet deep (measuring at right angles to the windows) shall have windows on at least two sides.

Note. For toilet room windows see order 5253.

Order 5204. Definitions of Courts. By inner court is meant an open air shaft or court surrounded on all sides by walls.

By inner lot line court is meant a court bounded on one side and both ends by walls and on the remaining side by a lot line.

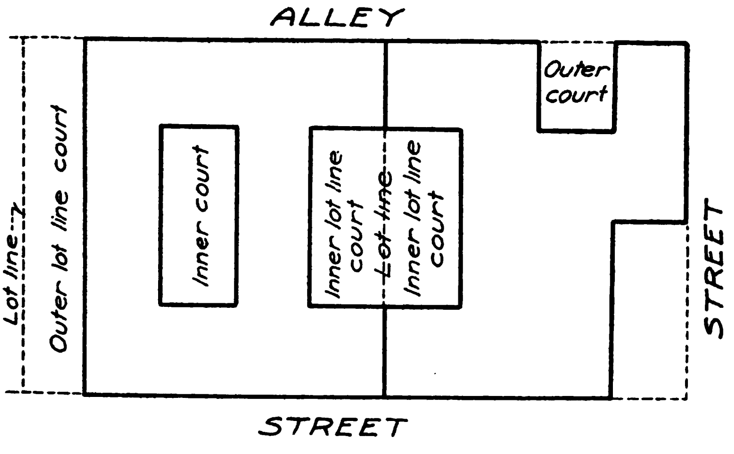
By outer court is meant a court extending to a street, alley, or open space not less than 15 feet wide.

By outer lot line court is meant a court with one side on a lot line and opening to a street or open space not less than 15 feet wide.

In applying the following requirements, a building from 30 to 43 feet high shall be considered as having at least three stories, and each additional 13 feet shall be considered an additional story.

Order 5205. Size of Courts. No outer lot line court, measured from the lot line to the wall of the building, shall be less than 3 feet wide for a court two stories or less in height and 40 feet or less in length. For each additional story in height, the width of such court shall be increased one foot; and for each additional 15 feet or fraction thereof in length, the width of such court shall be further increased one foot.

No outer court between wings or parts of the same building, or between different buildings on the same lot, shall be less than 6 feet wide for a court two stories or less in height and 40 feet or less in length. For each additional story in height, the width of such court shall be increased one foot; and for each additional 10 feet or fraction thereof in length, the width of such court shall be further increased one foot.



COURTS

In the case of an outer court or an outer lot line court which is open at each end to a street or open space not less than 15 feet wide, the above lengths may be doubled.

No inner lot line court shall be less than 6 feet in width, or less than 60 square feet in area, for courts two stories, or less in height, except that an inner lot line court one story high shall be not less than 4 feet wide and not less than 40 square feet in area; and for every additional story every such inner lot line court shall be increased by at least one lineal foot in its length and one lineal foot in its width.

No inner court shall be less than 10 feet in width nor less than 150 square feet in area for courts two stories or less in height; and for every additional story every such inner court shall be increased by at least one lineal foot in its length and one lineal foot in its width.

No court shall be covered by a roof or skylight but the entire required area shall be open and unobstructed from the bottom thereof to the sky. No fire escape or stairway shall be constructed in any court unless the court be enlarged proportionately.

All walls of inner courts whose least horizontal dimension is less than one fourth the height, shall be faced with material with a permanent white surface or shall be painted white at least every two years.

No buildings shall be altered or enlarged to encroach upon space reserved under this code for light and air on the lots or parcels of ground on which such building is erected.

Order 5206. Ventilation of Courts. At the bottom of every shaft or inner court there shall be sufficient access to such shaft or court to enable it to be properly cleaned out. Every inner court which is required under order 5203 and which is more than one story in height shall have an intake for fresh air, leading from the street or other open space. The area of such intake in square feet shall equal at least two one-thousandths of the number of cubic feet contained in said court; but such area need not be more than 50 square feet. Every intake shall be constructed of fireproof material and unless said intake is used as a passageway for persons, there shall be no openings into the same other than the inlet and outlet.

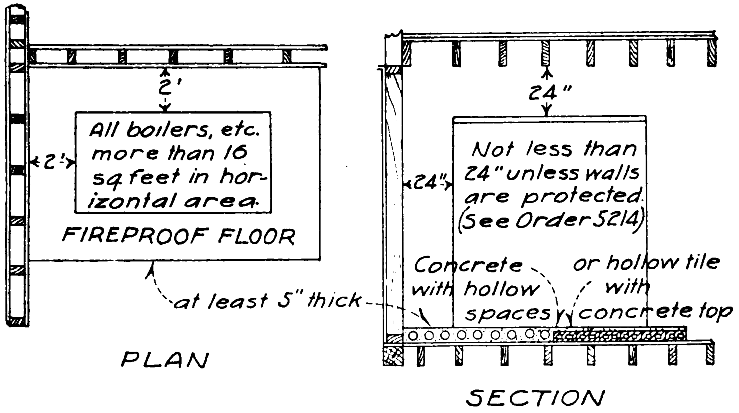
SECTION 5. BOILERS, FURNACES AND STOVES.

Order 5210. Fireproof Room. Every boiler operating with more than 15 pounds steam pressure per square inch shall, together with furnace and breeching, be enclosed with a standard fireproof enclosure and fireproof ceiling and floor, or be located in a separate building, or be separated from the remainder of the building by a division wall as described in order 5202.

See also orders 5527, 5617, 5720.

Order 5211. Protection of Floor. Every boiler, furnace or oven shall be placed on a fireproof floor projecting at least two feet on all sides. Such floor shall also be provided for every coal, wood, or oil stove or range which is more than 16 square feet in horizontal area or which has a flame at the bottom. If any such floor rests on or is in contact with any combustible material, then the fireproof floor layer shall be at least 5 inches thick and shall be hollow, with air spaces running horizontally through the same. The air spaces shall be open at both ends and shall be so placed that air can circulate through them; the horizontal area shall equal at least ½ the horizontal area of the fireproof slab.

Note. The purpose of these air spaces is to permit air to circulate through the fireproof slab and keep down its temperature. When a range or a heater rests on a solid layer of brick or concrete, it has been found that after several months the heat strikes through to the wood below. Many fires have been caused in this way.


2'
2'
All boilers, etc. more than 16 sq feet in horizontal area.
FIREPROOF FLOOR
at least 5" thick
PLAN
24"
24"
Not less than 24" unless walls are protected. (See Order 5214)
Concrete with hollow spaces
or hollow tile with concrete top
SECTION

The air spaces may be secured by using hollow tile placed end to end; or by imbedding wrought or sheet iron pipes (say 2 inch diameter, or larger) in a layer of concrete.

The air spaces should run parallel to the short dimension of the slab.

If the stove, range, etc., is raised at least 6 inches above the floor and such air space is not enclosed, then the fireproof floor layer may be reduced to not less than 2 inch solid thickness, without air spaces, provided it is covered with sheet metal.

Every coal, wood, or oil stove or range not more than 16 square feet in horizontal area and not having a flame at the bottom shall, if placed on a combustible floor, be raised at least 6 inches above the floor, and such air space shall not be enclosed. Such floor shall be protected with a stove board of sheet metal or asbestos, projecting at least one foot on all sides.

Note. A double shell heating furnace or stove, located in the room which it is designated to heat, is considered a "stove."

Gas stoves shall be protected as above specified, except that

(1) a three inch solid fireproof floor layer, projecting at least 6 inches on all sides, shall be sufficient protection if the stove has a false bottom at least 3 inches above such fireproof floor; and

(2) if the stove is less than 16 square feet in horizontal area and has a false bottom at least 5 inches above the floor, no fireproof floor shall be required.

Order 5212. Protection of Walls and Ceiling. No boiler, furnace, oven, stove, or range, whether encased or not, shall be placed less than 24 inches away from any nonfireproof wall, partition or ceiling; except that such distance may be reduced to 12 inches if the wall, partition, or ceiling is protected with at least ¼ inch asbestos board covered with galvanized sheet metal, or with equivalent protection as specified in order 5112.

The above distances may be reduced one-half in the case of stoves and ranges less than 16 square feet in area, and also in the case of gas ranges of greater area if proper insulation is incorporated in the back of the range.

The top of every boiler, furnace or oven, shall be covered with asbestos, sand, or other heat resisting material, or the required distance above same shall be increased 100 per cent.

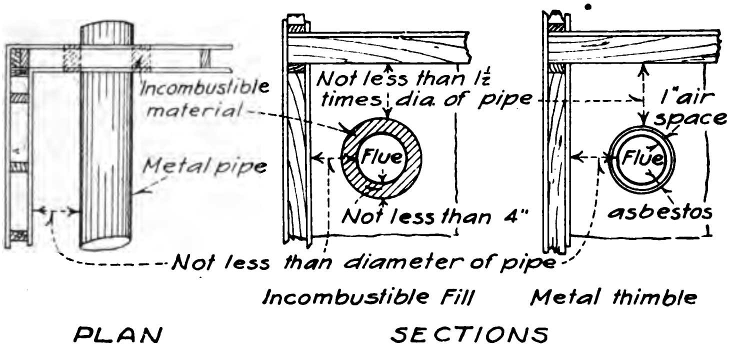
SECTION 6. SMOKE PIPES.

Order 5213. No smoke pipe shall pass through any floor, outside window or door, nor through any combustible roof or combustible outside wall, nor through any closet, attic or similarly concealed space.

Every smoke pipe passing through a non-fireproof partition shall be encased with incombustible material at least 4 inches thick or with a double safety thimble made of two concentric rings of sheet metal with at least one inch open air space between and with the outer ring covered with at least ¼ inch asbestos.

Note. The double thimble is of no value unless it is kept free from dirt. The best protection is a casing of solid masonry, with ¼ inch space between the masonry and the pipe.

No part of any smoke pipe shall be placed nearer to any non-fireproof partition or wall than the diameter of the pipe, nor nearer to any non-fireproof ceiling than one and one-half times the diameter; but the above distances may be reduced by one-half, if the wall or ceiling is covered with not less than ¼ inch asbestos board covered with galvanized sheet metal, or with equivalent protection as specified in order 5112.



METAL SMOKEPIPE INSULATION

SECTION 7. STEAM PIPES.

Order 5214. No steam pipe shall be placed within one inch of any woodwork. Every steam pipe passing through a combustible floor, ceiling or partition, shall be protected by a metal tube one inch larger in diameter than the pipe, and shall be provided with a metal cap. All wooden boxes or casings enclosing steam pipes, or wooden covers to recesses in walls in which steam pipes are placed, shall be lined with metal.

Note. A careful investigation has shown that steam pipes in contact with wood or similar material form a real fire hazard. There are a large number of cases on record where steam pipes, even under low pressure, have gradually caused the formation of charcoal and eventually a fire has resulted. The fatal Collinwood school fire probably started in this way.

SECTION 8. AIR PIPES AND REGISTERS.

Order 5215. Hot Air Pipes. Every hot air pipe contained in or passing through a combustible partition or floor shall be placed inside another pipe arranged to maintain a ¼ inch air space between the two pipes on all sides; or the pipe shall be securely covered with ¼ inch corrugated asbestos. The bend at the bottom of the vertical pipe shall be kept at least 2 inches from any woodwork.

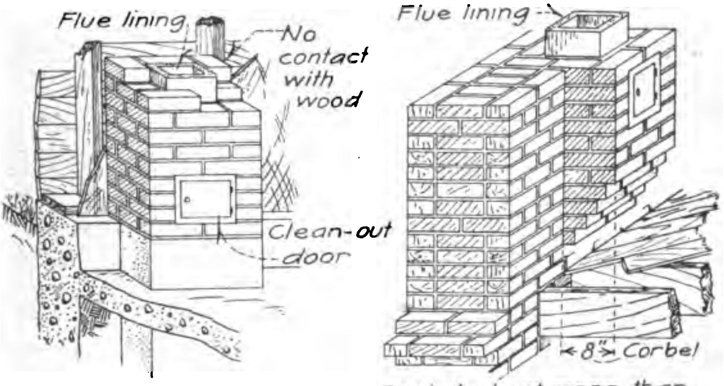
Note. Where a hot air pipe is placed in a 4 inch partition, metal lath over the pipe is recommended.

Order 5216. Registers. All register boxes shall be of metal, and shall either be double or be covered with asbestos not less than ⅛ inch thick.

Order 5217. Hot Air and Ventilating Flues. Every vertical hot air and fresh air flue or group of flues in the school, theater and hotel groups (see Order 5008) shall be enclosed with, or constructed of, incombustible material at least 2 inches thick, lined with metal or smoothly finished on the inside; except that frame buildings not more than two stories in height may have metal flues if protected as in order 5215. Horizontal ducts for hot air and fresh air, and all vent flues shall be constructed as in order 5215, or better.

SECTION 9. CHIMNEYS.

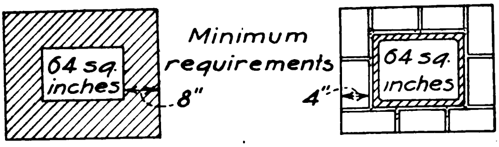
Order 5218. Construction and Foundation. Every chimney shall be built of brick or other approved fireproof material. No chimney shall rest upon a flooring of wood nor shall any wood be built into or in contact with any chimney. The foundation of every chimney, flue, or stack, shall be designed and built in conformity with the requirements for foundations of buildings. In no case shall a chimney be corbeled out more than 8 inches from the wall, and in every such case the corbeling shall consist of at least five courses of brick. Portland cement mortar shall be used above the roof line.



ON MASONRY FOUNDATION

Corbeled not more than 8" with not less than 5 courses of brick

CORBELED



Solid Masonry

Brick with Flue Lining

CHIMNEYS

Note. Smoke flues located inside of foul air flues should be of metal as required in order 5222, or of approved tile suitable for such flue purposes. Due to exposure of flue to weather and gasses, and the inaccessibility of the flue for replacement, metal should not be lighter than 16 gauge.

Order 5219. Minimum Thickness and Height. Every non-metallic chimney shall have walls at least 8 inches thick, unless a terra cotta, fire clay or other approved flue lining is used for the full height of the chimney, in which case the walls shall not be less than 4 inches thick. No smoke flue shall have a cross sectional area less than 64 square inches, except that flue linings 7″ x 7″ inside, or 8 inches in diameter inside, may be used. Concrete blocks shall not be used in chimney construction unless flue lining is used.

The top of every chimney shall be at least 5 feet above the top of the building of which it is a part, if the roof is flat, or at least 2 feet above the ridge if the roof is pitched. Every chimney shall be provided with a cleaning-out door at its base.

Vent pipes from gas stoves should be of tile and not less than 4 inches inside diameter.

Order 5220. Flues of More than 260 square inches. Chimneys with flues larger than 260 square inches shall have surrounding walls not less than 8 inches thick. The top of such a chimney shall be at least 8 feet above the roof.

Order 5221. Minimum Thickness to be Increased. Every chimney shall be designed throughout (the above minimum thicknesses being increased where necessary) in accordance with the requirements of the structural design of buildings and with the best engineering practice.

Order 5222. Metallic Smoke Stacks. No metallic smoke stack shall pass through any non-fireproof floor, ceiling, or roof, unless encased or lined with brick or other fireproof material of the same character and thickness as prescribed for non-metallic chimneys; or in place thereof, where such metallic chimney passes through the roof only, the chimney shall be separated from the roof by a 12 inch air space.

Order 5223. Wind Pressure. Every chimney shall be designed to withstand a wind pressure of at least 30 pounds per square foot. In circular chimneys such pressure shall be assumed to act over not less than one-half of the diametrical area.

Note. Metal chimneys held by cable guys should have at least four (preferably five) guys. The following example will illustrate the size of cables needed.

Assume a chimney 70 feet high and 30 inches in diameter; guys attached 20 feet below top of chimney; slope of guys, 30 degrees with the horizontal (that is, guys reach the ground about 85 feet from the chimney). The guys should then be not less than one-half inch galvanized cables or two sets of 3/8 inch cables could be used. Proper anchors must be provided which will develop the full strength of the cable.

It is very important that guys be so arranged that they will not become weakened by chafing. If the guy is fastened to an eyebolt it shall be protected by a steel shield which will take the wear.

SECTION 10. LIGHTS.

Order 5224. Oil lamps shall not be used when gas or electricity is available, except in private apartments.

Gas and oil lights shall be placed at least 6 feet above the floor level, at least 6 inches from any combustible partition or wall, and at least 2 feet (measured from top of flame) below any combustible ceiling unless properly protected by a metal shield with at least 2 inches of air space above. Swinging brackets shall be provided with a guard or stop so that the light cannot come nearer to the partition or wall than one foot. In aisles and public passageways, every such light shall be protected by an incombustible guard unless the light is at least 6 feet 6 inches above the floor.

Note. Especial care should be taken to prevent curtains or draperies from coming into contact with a flame. Gas and oil lights should be kept at least two feet away from any door or window where curtains are used.

Every gas supply main shall have a service cock outside of the building, so placed and maintained that it can be shut off at any time without entering the building.

See also orders 5410, 5529—31, 5715.

Note. Most large cities now require a specially designed cock which does not become clogged with rust or ice, and which can easily be located and shut off by the fireman. This is very desirable as many small fires have become serious through the breaking of gas pipes in the building.

SECTION 11. ELECTRICAL WORK.

Order 5225. All electrical work shall conform to the Wisconsin State Electrical Code, comprising General Orders 1000-1499, inclusive, of the Industrial Commission.

See also order 5543 (motion picture booths).

SECTION 12. SPECIAL HAZARDS.

Order 5230. Laundry Drying Room. Every laundry drying room shall be of fireproof construction, with all interior openings protected by standard fire doors.

No heating appliance burning fuel shall be used in any such room.

(For laundry requirements in schools, hotels, etc., see orders 5617 and 5720).

Order 5235. Dry Cleaning Establishments. Every dry cleaning establishment shall be of fireproof construction, and shall not be more than three stories in height. A building not more than one story in height shall be either a separate building, or a separate portion of a building, isolated by means of standard fire walls, all openings in which are protected by automatic standard fire doors where sills are not less than 6 inches above the floor.

Exception. Wood roof may be used on one story buildings if they are at least 15 feet from any other building.

A building more than one story in height shall be occupied exclusively by the dry cleaning establishment.

The lowest floor of any building used for dry cleaning shall be above grade and there shall be no basement or other open or air space below such floor line. All windows, doors or other openings within 50 feet from any other building shall be protected by standard fire doors or standard windows. Doors in outside walls shall have sills flush with floor level.

An efficient ventilating system shall be provided for all wash rooms and drying rooms in every dry cleaning establishment. Unless an exhaust system with fan in continuous operation is installed, a gravity ventilating system with vent openings at floor and ceiling must be provided.

Note. See section 167.21 of the Wisconsin Statutes, regulating the construction of cleaning and dyeing plants. This law supercedes conflicting portions of order 5235.

Order 5240. Public Garages. A public garage is any building which accommodates more than two automobiles, motorcycles, tractors or other motor driven vehicles designed to use volatile inflammable liquid for fuel or power, except that buildings in which such new motor vehicles which do not contain oil, volatile inflammable liquid or storage batteries are stored, need not be included in this classification.

Note. The exception in the last half of the above paragraph was adopted by the Commission when certain automobiles were shipped knockdown and so stored in warehouses until needed for display or sale. The exception applies only to such partially unassembled vehicles and does not apply to cars on display.

All public garages shall have walls and roof of ordinary construction or better.

All floors of storage rooms, sales rooms, and repair shops in public garages shall be of fireproof construction; except that the floors of garages not more than 3 stories in height may have floor panels of protected construction. See order 5100-A.

Where public garages are built in connection with buildings used for other purposes they shall be separated therefrom by means of standard fire walls, and unpierced fireproof floors and ceilings; except that where the second floor consists of only one apartment covering not more than 1,000 square feet of floor area the ceiling of garages may be semi-fireproof.

All walls, or parts of walls of public garages nearer than 5 feet to any other building or boundary line between premises shall be unpierced; all walls, or parts of walls nearer than 10 feet to any other building or boundary line between premises shall have all openings protected by means of standard fire windows and standard fire doors.

Parapet walls shall be provided as described in order 5310.

For parapet wall requirement see Order 5310.
For electrical wiring see Order 5225.
See also General Orders on Fire Prevention issued by the Industrial Commission.
For private garages see Order 5006.

NOTE ON ELEVATORS AND ELEVATOR ENCLOSURES.

See elevator code issued by the Industrial Commission.

SECTION 13. TOILET ROOMS.

These orders are enforced jointly by the Industrial Commission and the State Board of Health.

For the number of closets and urinals required in buildings of various classes see orders 5532, 5618, 5722, 2203.

For detailed requirements regarding fixtures, piping, etc., see State Plumbing Code issued by the State Board of Health.

Approval by an "authorized agent" means

1. By a plumbing inspector of the State Board of Health or a deputy of the Industrial Commission.
2. By the city building department or city health department where such department, acting under the provisions of a city ordinance, issues an order or a permit for the work in question; or
3. By the city plumbing inspector in cases not covered by 2.

Order 5250. Toilet Rooms Required. Every place of employment and every public building hereafter constructed (including all buildings covered by the State Building Code), shall have adequate toilet rooms, completely enclosed, and so arranged as to insure privacy; except that where no dust prevails in foundries, rolling mills, blast furnaces, tanneries, and such other similar buildings as are specified by the Industrial Commission, partitions enclosing toilets shall be at least seven feet high but need not be carried to the ceiling nor enclosed at the top, provided such ceiling is at least fifteen feet high, and provided such toilets are located in rooms which females are not allowed to enter.

Note. The above exception will be permitted even though the ceiling is lower than 15 feet, if local ventilation through the closet bowl is provided in a manner approved by the Industrial Commission or the State Board of Health.

Toilet rooms should, if possible, be placed on each occupied floor, especially in factories. Much time may thus be saved.

Order 5251. Toilet Rooms for the Two Sexes. Where the two sexes are accommodated, separate toilet rooms shall be provided except

(1) In apartment houses;

(2) If approved in writing by the Industrial Commission or the State Board of Health, or their authorized agents, in buildings accommodating not more than five persons of both sexes, provided the door of such toilet room is kept locked and the key is kept in a place accessible to all such persons. But whenever the number of such persons shall exceed five, separate toilet rooms shall be provided.

Entrances to toilet rooms for the two sexes shall be properly separated, by screens or otherwise, and shall, wherever possible, be at least twenty feet apart.

Order 5252. Sex Designated. Wherever women are employed or accommodated, each toilet room shall be distinctly marked with regard to the sex which uses it, and no person shall be allowed to use a toilet room assigned to the other sex, except as provided in order 5251.

Order 5253. Location, Light, Ventilation. Every toilet or bathroom shall be so located as to open to outside light and air, by windows and skylights opening directly upon a street, alley, court, or vent shaft, except as hereinafter provided. Every such vent shaft shall have a horizontal area of at least one square foot for each water-closet or urinal adjacent thereto, but the least dimension of such shaft, if one story high, shall not be less than three feet; if two stories high, not less than four feet; and one foot additional for each additional story.

The glass area for a toilet room containing one closet or urinal shall be at least 4 square feet, with 2 square feet additional for each additional closet or urinal.

In addition to the windows herein required, each toilet room which contains more than three fixtures (closets and urinals) shall have a vent flue of incombustible material, vertical or nearly so, running through the roof with a cap or hood of the siphon type, or its equivalent, and the vent shall be not less than the following sizes:

Four fixtures	8 inch pipe
Five or six fixtures	10 inch pipe
Seven to ten fixtures	12 inch pipe

But if the windows or skylights can not be opened, then vent pipes shall be provided as specified in order 5254.

No toilet room shall have a movable window or ventilator opening on any elevator shaft, or any court which contains windows of sleeping or living rooms above, except that a toilet room containing not more than two closets may have a movable window on such court, provided such room has a vent flue running above the roof.

Note. See Heating and Ventilation Code for more definite ventilation requirements for toilets.

Order 5254. Location Without Outside Windows—When Permitted. If a location with outside windows is impracticable, a different location will be permitted, as follows:

(1) For a toilet used by not more than three persons,—without special permit.

(2) For a toilet in a new building, used by more than three persons,—only with the written approval of the Industrial Commission of the State Board of Health, or their authorized agents.

(3) For a new toilet in an existing building, used by more than three persons,—only with the written approval of the Industrial Commission or State Board of Health, or their authorized agents.

Such approval shall be granted only where a location with outside windows is not reasonably possible.

Where a toilet room without outside windows is permitted, it shall have a fixed window or windows to an adjoining room, with glass area as provided above, arranged so as to furnish as much light as possible. Frosted or other translucent glass shall be used when necessary for privacy. In no case shall the floor be of wood. A vent flue of incombustible material shall be provided, vertical or nearly so, running through the roof, with a cap or hood of the siphon type, or its equivalent, and the vent shall be not less than the following sizes:

One fixture (closet or urinal)	6 inch pipe
Two fixtures	8 inch pipe
Three fixtures	10 inch pipe
Four or five fixtures	12 inch pipe
Six or seven fixtures	14 inch pipe
Eight or ten fixtures	16 inch pipe

Note. (1) Glass area 50 per cent greater than required, is recommended.

(2) An air inlet is recommended if it can be made soundproof.

(3) A fan in the flue will be required if necessary for proper ventilation. If there is no fan, a steam coil, or even an electric light at the bottom of the flue, will help to produce circulation. Where a metal vent pipe extends above the roof, a double pipe or other insulation against cold, is recommended.

(4) Closets provided with a local vent are recommended and may be required in some cases before approval is granted.

Order 5255. Artificial Light. Every toilet room (except in a private apartment) shall be artificially lighted during the entire period that the building is occupied, wherever and whenever adequate natural light is not available, so that all parts of the room are easily visible.

Order 5256. Size. Every toilet room shall have at least 10 square feet of floor area, and at least 100 cubic feet of air space, for each water-closet and each urinal.

Order 5257. Floor. The floor and base of every toilet room shall be constructed of material (other than wood) which does not readily absorb moisture and which can be easily cleaned; except that wood floors may be used

(1) In private apartments;

(2) If approved in writing, by the Industrial Commission or the State Board of Health, or their authorized agents, in existing buildings where there is an existing wood floor in good condition and where such toilet will be used by not more than five persons, provided further that such room must have an outside window or skylight.

Note. To make a concrete floor non-absorbent, the concrete must be a dense, rich mix, finished smooth and should be kept painted.

Order 5258. Walls and Ceilings. The walls and ceilings of every toilet room shall be completely covered with smooth cement or gypsum plaster, glazed brick or tile, galvanized or enameled metal, or other smooth, non-absorbent material. Wood may be used if well covered with two coats of body paint and one coat of enamel paint or spar varnish. But wood shall not be used for partitions between toilet rooms, nor for partitions which separate a toilet room from any room used by the opposite sex. All such partitions shall be as nearly soundproof as possible.

Note. The above is not intended to prohibit the use of ordinary stud partitions between rooms if partitions are lathed and plastered on both sides.

Walls and partitions should be of light color to increase illumination and facilitate cleaning.

In large rooms a hose connection and a floor drain should be provided.

Order 5259. Partitions Between Fixtures. Adjoining water-closets shall be separated by partitions. Each individual urinal or urinal trough shall be provided with partition at each end and at the back, to give privacy. Where individual urinals are arranged in batteries, a partition shall be placed at each end and at the back of the battery. A space of 6 to 12 inches shall be left between the floor and the bottom of each partition. The top of the partition shall be from 5½ to 6 feet above the floor. Doors with the top 5½ feet above the floor, and the bottom 6 to 12 inches above the floor, shall be provided for all water-closet compartments. All partitions and doors shall be of material and finish required by order 5258 for walls and ceilings.

Note. Wood is not recommended; if used, it should be hardwood.

Water-closet compartments shall be not less than 30 inches in width, and shall be sufficiently deep to permit the door to swing past the fixture when opened. Doors must swing inward.

Recommendation: It is recommended that doors be equipped with a spring or other device so that they will remain open when compartment is vacant and will need to be latched to hold shut when compartment is occupied.

Order 5260. Fixtures. Only individual water-closets of porcelain or vitreous chinaware shall be used. (See State Plumbing Code, sections 51–54, for further details, also for type of frost–proof closets permitted.) Water–closet seats shall be of wood or other non-heat-absorbing material, and shall be finished with varnish or other substance so as to be impervious to water.

Urinals shall be made of material impervious to moisture, and of such design, materials, and construction that they may be properly flushed and kept in a sanitary condition.

In all new installations in schools, theatres, hotels, office buildings, mercantile buildings, libraries and museums, or similar public buildings, only individual urinals shall be used. Such individual urinals shall be of porcelain or vitreous china, set into the floor, the floor graded toward the urinal, and shall be equipped with an effective automatic tank or valve or satisfactory foot operating flushing device.

Order 5261. Protection from Frost. All water-closets and urinals and the pipes connecting therewith shall be properly protected against frost, either by a suitable insulating covering, or by providing and operating a suitable heating apparatus, or in some other approved manner; so that such water-closets and urinals will be in proper condition for use at all times.

Note. Toilets should be adequately heated in cold weather. Heating equipment should be arranged to permit cleaning of floors and walls.

Order 5262. Where no Sewer System is Available. Each water-closet and urinal and each lavatory or slop sink located in a toilet room, shall be connected with a sewer system, where a sewer system is available. In locations where a sewer system is not available, or cannot be made available, the disposal of human waste may be accomplished as follows:

(1) Sewage treatment tank and disposal system.

Note. For detailed requirements on such systems, see State Plumbing Code.

(2) Where the local conditions make it impractical to install such system, outdoor toilets (see order 5263) or other facilities permitted by the State Board of Health may be

used; provided that in the case of places of employment for more than ten persons, schools larger than one room, and apartment or tenement houses, water flush toilets as herein described shall be provided, unless outdoor toilets or other facilities are permitted in writing by the Industrial Commission or the State Board of Health.

Order 5263. Outdoor Toilets. Outdoor toilets shall comply with orders 5250 to 5259, inclusive, and in addition shall be

(1) Located on ground that is well drained, and where there is no possibility of contaminating any drinking water supply.

(2) Provided with suitable approach, such as concrete, gravel or cinder walk.

Note. For schools a concrete walk is recommended.

(3) The foundations shall be of concrete or other masonry.

(4) The vault shall extend at least 6 inches above ground, be as dark as possible, and be proof against entrance by flies, rats, or other vermin. The upper portion shall be of concrete, or of brick or stone laid in cement mortar. If in damp ground the entire vault shall be of concrete, or brick or stone laid in cement mortar.

(5) All windows, ventilators and other openings shall be screened to prevent the entrance of flies, and all doors shall be self-closing. A separate ventilator shall be provided for the vault and shall extend above the roof and be provided with an effective ventilating hood.

(6) The entire installation must be kept clean and sanitary. Milk of lime (freshly slaked lime) or other equally effective disinfectant must be used in the vault and in the urinal trough in sufficient quantities, and at frequent intervals. The floors, seats and urinals must be scrubbed as often as necessary. The vault must be cleaned out at proper intervals.

Note. See the Wisconsin Code for Rural School Privies issued by the State Board of Health.

Order 5264. All Toilets, Cleanliness. Every toilet room and every part thereof, including walls, floors and ceiling, and all fixtures therein, must be kept clean, efficient, and in good repair. In each toilet room sufficient toilet paper must be provided, and it must be made of material which will not obstruct the fixtures in such toilet room.

Order 5265. Indecent Pictures. Indecent or suggestive marks, pictures, or words are forbidden in toilet rooms, and such defacement when found must be at once removed.

Order 5266. Service Closet. Where practical a service closet conforming with requirements for construction of toilet rooms shall be provided and supplied with mop, broom, bucket, soap, toilet paper, and toweling necessary for sanitary upkeep of toilet rooms.

EXTRACT FROM GENERAL ORDERS ON SAFETY

Order 56.—Window Cleaners. In all public buildings and places of employment every window above the first story, or where the top of the window is more than 20 feet from the ground, except windows which are cleaned from within, must be provided with an efficient safety device to protect the window cleaner. Such safety device must consist of:

(a) A safety belt must be provided for each window cleaner, which belt must be fastened at each end to a permanent attachment which must be bolted through the window frame and be secured by a nut and washer on the inside; or

(b) A substantial, movable platform which is projected through the window for the window cleaner to stand upon and which is provided with a substantial railing; or

(c) Other equally efficient device.

Part IV

STRUCTURAL DESIGN

Only the most general features of structural design are touched on in this code. Detailed requirements may be adopted by cities if they desire. Such details are beyond the scope of this code and would be of no particular benefit. "Rules cannot produce or supersede judgment; on the contrary, judgment should control the interpretation and application of rules," whether the rules are general or detailed.

Either safety or economy, and often both, will be sacrificed unless both the designer and the builder have a competent knowledge of building construction in general and of the particular kind of construction which is being used.

Such details as are given in the following orders are typical, not restrictive. The Industrial Commission will, on application, approve any other type of design which affords equal strength and security in accordance with standard practice. See under "Appeal," p. 9.

SECTION 1. FLOOR AND ROOF LOADS.

Order 5300. The minimum stresses to be resisted by any structure shall be calculated by adding to the weight of the structure, called dead load, the following superimposed live loads uniformly distributed in pounds per square foot of horizontal area.

Theaters, Assembly Halls, and other places of assemblage:—

Auditorium with fixed seats	70
Lobbies, passageways, stairways and auditoriums or places of assemblage without fixed seats	120
Dance halls	120
Theater stage	150

School Buildings, Libraries, and Museums:—	
Classrooms and rooms for similar use	60
Corridors, laboratories, and similar public parts of the building	80
Hotels, Apartment and Tenement Houses, Clubhouses, Hospitals, and Places of Detention:—	
Private rooms and apartments	50
Public corridors, offices, lobbies, dining rooms, etc.	80
Office Buildings:—	
First floor	100
Upper floors	60
Grand stands	100
All stairs	100
Workshops, factories and mercantile establishments	100

In warehouses, workshops, factories and mercantile establishments used for the sale, storage or manufacture of heavy merchandise or machinery the floors shall be designed to carry all loads safely, including an allowance of at least 25 per cent for vibration where such occurs.

Roofs	30
Sidewalks	150

In any building where the floor load on any floor is taken as more than 150 pounds per square foot, the sidewalk load shall be taken equal to the maximum floor load.

The foregoing floor loads (but not the roof or sidewalk loads) may be decreased by 20 pounds in buildings of fireproof construction.

Note. This reduction is permitted because (1) A fireproof floor suffers little or no deterioration; (2) A fireproof floor is not weakened by fire below; (3) The greater dead load of a fireproof floor means that any accidental overload is a small proportion of the total dead and live load.

Concentrated, partial, and eccentric loading shall also be provided for.

The joists, beams, girders, columns, and walls, supporting the roof shall be designed to carry the full loads.

Floor girders and trusses over 30 feet long shall be designed to carry not less than 85 per cent of the live load besides the dead load; except that in hotels, apartment and tenement houses, hospitals, club houses, and office buildings they shall be designed to carry not less than 75 per cent of the live load besides the dead load.

In a factory, store, warehouse or similar commercial building, the live load to be supported by walls, columns and foundations, shall be assumed at not less than 85 per cent of the full live load of the top floor, 80 per cent of the next lower floor and 75 per cent for each succeeding lower floor.

In all other buildings the live loads to be supported by walls, columns, and foundations, shall be assumed at not less than 85 per cent of the full live load of the top floor and 5 per cent less for each succeeding lower floor until a ratio of 50 per cent is reached, which shall be used for all succeeding lower floors.

SECTION 2. WIND PRESSURE.

Order 5301. Every building shall be designed to resist a horizontal wind pressure of 30 pounds for every square foot of exposed surface, in addition to the dead loads and the live loads specified above.

If the overturning moment due to wind pressure exceeds 75 per cent of the moment of stability of the structure due to dead load only, the structure shall be anchored to its foundations, which shall be of sufficient weight to insure the stability of the structure; and sufficient diagonal bracing or rigid connections between uprights and horizontal members shall be provided to resist distortion.

The overturning moment may be disregarded in a structure less than 100 feet in height if the height does not exceed twice the width.

When the stress due to wind in any member is not greater than 50 per cent of the stress due to the dead and live loads, it may be neglected. When the wind stress is greater than 50 per cent of the dead and live load stresses, then the sum of all these stresses shall not exceed 150 per cent of the stresses hereinafter provided.

SECTION 3. FOUNDATIONS.

Order 5302. The permissible loads on natural earth shall not be more than the following, in tons per square foot:

Quick sand and alluvial soils	½
Soft clay	1
Ordinary clay and sand together in layers, wet and spongy	2
Clay or fine sand, firm and dry	3
Sand, compact and well cemented	4
Gravel and coarse sand, well packed	5
Hard pan or shale	6

The maximum load on a timber pile shall not exceed 500 pounds per square inch, and shall be determined by the following formula:

$$L = \frac{2WH}{S + 1/10} \text{ for steam hammer}$$

$$L = \frac{2WH}{S + 1} \text{ for drop hammer}$$

in which formula

W = weight of hammer in pounds.
L = safe load in pounds.
H = fall of hammer in feet.
S = penetration under last blow in inches, assumed to be sensible at an approximately uniform rate.

SECTION 4. MASONRY CONSTRUCTION.

Order 5303. Unit Stresses. The following unit compressive stresses (pounds per square inch) shall not be exceeded:

Kind of Mortar	Lime 1:3	Lime and Portland Cement ½:½:3	Portland Cement 1:3
Standard common brick (crushing strength 1800)	100	125	175
Hard or select brick (crushing strength 3000)	150	180	270
Rubble, well bonded	80	100	150
Hollow tile or concrete blocks (see order 5309) gross area			60
Concrete (see order 5313)			

For any other type of masonry the unit stress shall be calculated on the basis of a factor of safety of 10 or more, in accordance with standard practice.

Order 5304. Brick Bearing Walls. For all non-fireproof buildings except office buildings and buildings of the apartment house and hotel class, the outside, party, division and other bearing walls shall be not less than 12 inches thick in the upper two stories, increasing four inches in thickness for each two stories (or fraction) below, except as hereinafter provided; no such two story height shall exceed 30 feet. But the first story side walls of a three story building may be 12 inches thick if laid in Portland cement mortar and if the second floor joists are supported by wall hangers. Any wall which is not more than 50 feet long between crosswalls may be reduced to the thickness specified for fireproof buildings.

For all fireproof buildings, and for non fireproof office buildings and buildings of the apartment house and hotel class, the outside, party, division and other bearing walls shall be not less than 12 inches thick in the upper three stories, increasing 4 inches in thickness for each 3 stories (or fraction) below, except as hereinafter provided; no such three story height shall exceed 45 feet.

A building not more than three stories in height may have 8-inch walls in the upper story, provided such story is not more than 10 feet high in the clear, and the span is not more than 20 feet, and the wall is not more than 60 feet long between cross walls, offsets or pilasters. A building not more than one story in height may have 8-inch walls provided the clear story height is not more than 12 feet, the roof span is not more than 25 feet, and distance between cross walls, offsets or pilasters is not more than 60 feet. All other one story buildings shall have all bearing walls not less than 12 inches thick.

Eight inch partition walls may be 14 feet high in the clear, but not more than 40 feet long between pilasters or cross walls. But no 8-inch wall shall serve as a party or fire wall.

Note. (a). To secure proper protection against a severe fire it is recommended that division walls, and outside walls of fireproof or mill buildings, be made at least 12 inches thick of brick or plain concrete, or of reinforced concrete as described in order 5315.

Note. (b). In case of long spans or heavy floor loads, the thickness of walls must be increased if necessary so that the allowable unit stresses will not be exceeded.

Every wall shall be bonded with header courses extending through the wall at intervals no greater than every sixth course.

If any horizontal section of any bearing wall shows more than 40 per cent reduction of area on account of flues, openings or recesses, the wall shall be proportionally increased in thickness.

Order 5305. Curtain Walls. Curtain walls supported at every floor level shall be not less than 8 inches thick, provided the vertical height between beams is not more than 12 feet. For the first story the unsupported height may be not more than 18 feet provided the pilasters or columns are not more than 20 feet apart. See note (a), preceding order.

All other walls shall be not less than 12 inches thick.

Order 5306. Stone Walls. Stone walls shall be 4 inches thicker than required for brick walls and shall be similarly bonded.

Order 5307. Stone or Terra Cotta Facing. Stone facing not less than 4 inches thick, and architectural terra cotta which extends not less than 4 inches into the wall and which is filled solid with concrete or with brick and mortar, may be considered as part of the required thickness of a wall if substantially bonded to the backing as required for brickwork. No such wall shall be less than 12 inches thick.

Order 5308. Hollow Walls. In all walls that are built hollow, the same quantity of material shall be used as if they were built solid, and the parts of such hollow wall shall be connected with proper ties placed not more than 24 inches apart.

Order 5310. Parapet Walls. All exterior, division and party walls of non-fireproof buildings shall have parapet walls not less in thickness than the wall below, carried to

3 feet above the roof and capped with incombustible material; but this order shall not apply to buildings where frame construction would be permitted; nor to walls of buildings where not less than 10 feet of vacant space is maintained between the wall and the boundary line between premises.

Order 5311. Recesses. Recesses for water, sewer or other pipes shall not be deeper than one-third the thickness of the wall and the recesses around such pipes shall be filled up with solid masonry for a space of one foot at the top and bottom of each story.

Order 5312. Old Walls. Walls heretofore built as party walls but which are not in accordance with the requirements of this section may be used if in good condition provided the height of the same be not increased.

In case it is desired to increase the height of an existing party or independent wall, which is less in thickness than required under this section, the same shall be done in one of the following ways:

(1) By a lining of brick work, supported on a proper foundation, and forming a combined thickness with the old wall of not less than 4 inches more than the thickness required for a new wall; no lining shall be less than 8 inches in thickness; all lining shall be laid up in cement mortar, and thoroughly anchored to the old wall with suitable iron anchors, placed not over 2 feet apart, the old wall being first cleaned of plaster or other coating; or

(2) Such old wall may be increased in height if the new live and dead loads are uniformly distributed over the entire old wall by means of a distributing girder and if the total load does not exceed the allowable unit stresses; or

(3) The new wall may be carried by steel or concrete columns.

SECTION 5. CONCRETE CONSTRUCTION.

Order 5313. Unit Stresses and Reinforcement. The following unit stresses (pounds per square inch) shall not be exceeded.

Reinforced Concrete, 1:2:4 mix:—

Compression in concrete, extreme fibre, (assuming a straight line stress distribution)	700
Tension in concrete	none
Compression in steel—15 times the compression in concrete at the same point.	
Tension in steel	16,000
Bond between concrete and steel	80
Shear in concrete	40
Compression on net core area of concrete column, with longitudinal and transverse reinforcement each equal to at least 1 per cent of the core volume	800
Compression of net core area of a similar column but with concrete of a 1:1½:3 mix	900
Compression on net core area of a column with less reinforcement than the above	500

Plain Concrete:—

	Compression	Shear	Tension due to bending
1:2:4 mix	400	40	35
1:2½:5 mix	300	35	30
1:3:6 mix	250	30	25

Note. The foregoing are maximum stresses, suitable for concrete which will develop a crushing strength of at least 2,000 pounds per square inch in 28 days, with a 1:2:4 mix. Where fine sand (very common in Wisconsin) or soft stone is used, the stresses should be decreased or the proportion of cement increased. The following table indicates what strength may be expected with different aggregates, with good coarse sand and good workmanship:

Aggregate	1:1:2	1:1½:3	1:2:4	1:2½:5	1:3:6
Granite, trap rock	3300	2800	2200	1800	1400
Gravel, hard limestone and hard sandstone	3000	2500	2000	1600	1300
Soft sandstone and sandstone	2200	1800	1500	1200	1000
Cinders	800	700	600	500	400

Joint Committee on Concrete and Reinforced Concrete.

The minimum longitudinal reinforcement of a column or beam shall be four ½ inch round rods. The minimum transverse reinforcement of a column or beam shall be the equivalent of ¼ inch round rods, averaging not more than 12 inches apart. The steel shall be protected by at least 1½ inches of concrete for columns, 1 inch for beams, and ½ inch for slabs; but this protection shall not be less than the diameter of the rod in any case. In any column longer than 15 times its least diameter the unit stresses shall be properly decreased. The transverse reinforcement shall not be considered in calculating the strength of a column.

Every concrete structure shall be designed in accordance with this code and with the rules and principles of standard practice.

Note (a). For proper fire-resistance the protection of reinforcement is recommended to be at least ½ inch greater than required above.

Note (b). "Standard Practice" is well illustrated in the report of the Joint Committee on Concrete and Reinforced Concrete, dated August 1921. The later report of this committee has not yet been accepted for application in Wisconsin.

Order 5314. Materials and Supervision. Only Portland cement shall be used which conforms to the Standard Specifications of the American Society for Testing Materials in force Oct. 1, 1914. (Furnished on request.)

Steel shall be used for reinforcement which shall conform to the Standard Specifications of the American Society for Testing Materials in force Oct. 1, 1914. (Furnished on request.)

The supervision required by order 5200, includes, in the case of concrete structures, a close personal supervision by an experienced superintendent or inspector of the placing of reinforcement, mixing and placing of concrete, and removal of falsework or forms. Especially close supervision is necessary when the temperature falls below 40° F.

Order 5315. Concrete Walls. Plain concrete walls of 1:3:6 mix or better, may be built of the same thickness as required for brick walls. Basement walls of 1:2½:5 mix or better, may be built 4 inches less in thickness than required for brick walls but not less than the wall above.

Concrete walls may be of less thickness than required for brick walls if properly reinforced in accordance with the preceding orders. If such a wall serves as a required division or fire wall, or as the outside wall of a building which is required to be of fireproof or mill construction, such wall shall be of 1:2½:5 mix or better, not less than 6 inches thick, and reinforced with steel weighing not less than ½ pound per sq. ft., properly distributed. Such thickness and reinforcement shall be increased where necessary in accordance with standard practice.

SECTION 6. STEEL CONSTRUCTION.

Order 5316. Design, fabrication and erection of structural steel for buildings.

Note: The requirements contained in this order were adapted from the Standard Specification for Structural Steel for Buildings of the American Institute of Steel Construction.

1. Scope. This order applies to the design, fabrication and erection of all structural steel for buildings and structures under this code.

Note: Wrought iron, cast iron and cast steel are excluded from the scope of this order.

2. General. In the design of buildings, structures, portions of structures and structural members, only forms which are possible of rigid analysis shall be used.

3. Material. Structural steel shall conform to the Standard Specifications of the American Society for Testing Materials for Structural Steel for Buildings, Serial Designation A—9-24, as printed in the appendix to this code.

4. Loading. (a) Dead and live Loads. Steel structures shall be designed to sustain the dead weight imposed upon them, including the weight of the steel frame itself, and, in addition, the maximum live load as specified in each particular case. Proper provision shall be made for temporary stresses caused by erection.

(b) Impact. In cases where live loads have the effect of producing impact or vibration, a proper percentage shall be added to the static live load stresses to provide for such influences, so that the total stress found in any member is an equivalent static stress.

(c) Wind Pressure. Proper provision shall be made for stresses caused by wind pressure of 20 pounds per square foot of exposed surface during erection and after completion of the building.

If the overturning moment due to wind pressure exceeds 75 per cent of the moment of stability of the structure due to dead load only, the structure shall be anchored to its foundations, which shall be of sufficient weight to insure the stability of the structure; and sufficient diagonal bracing or rigid connections between uprights and horizontal members shall be provided to resist distortion.

(d) Anchorage. Proper provision shall be made to securely fasten the reaction points of all steel construction and transmit the stresses to the foundations of the structure.

5. Allowable Stresses. All parts of the structure shall be so proportioned that the sum of the maximum static stresses in pounds per square inch shall not exceed the following:

(a) Tension. Rolled Steel, on net section--------18,000

(b) Compression. Rolled Steel, on short lengths or where lateral deflection is prevented--------18,000

On gross section of columns,

$$\frac{18,000}{1+\frac{l^2}{18,000r^2}}$$

with a maximum of----------------------------15,000, in which l is the unsupported length of the column, and r is the corresponding least radius of gyration of the section, both in inches.

For main compression members, the ratio $\frac{l}{r}$ shall not exceed 120, and for bracing and other secondary members, 200.

(c) Bending. On extreme fibres of rolled shapes, and built up sections net section, if lateral deflection is prevented--------18,000. When the unsupported length l exceeds 15 times b, the width of the compression flange, the stress in pounds per square inch in the latter shall not exceed

$$\frac{20,000}{1+\frac{l^2}{2,000b^2}}$$

The laterally unsupported length of beams and girders shall not exceed 40 times b, the width of compression flange.

On extreme fibers of pins, when the forces are assumed as acting at the center of gravity of the pieces--------27,000

(d) Shearing. On pins ------------------------13,500

On power-driven rivets----------13,500

On turned bolts in reamed holes with a clearance of not more than 1/50 of an in.	13,500
On hand-driven rivets	10,000
On unfinished bolts	10,000

On the gross area of the webs of beams and girders, where *h*, the height between flanges in inches, is not more than 60 times *t*, the thickness of the web in inches 12,000
On the gross area of the webs of beams and girders if the web is not stiffened where *h*, the height between flanges in inches, is more than 60 times *t*, the thickness of the web, the maximum shear per square inch, $\frac{S}{A}$ shall not exceed

$$\frac{18,000}{1 + \frac{h}{7,200t^2}}$$

In which S is the total shear, A is gross area of web in square inches.

(e) Bearing	Double Shear	Single Shear
On pins	30,000	24,000
On power-driven rivets	30,000	24,000
On turned bolts in reamed holes	30,000	24,000
On hand-driven rivets	20,000	16,000
On unfinished bolts	20,000	16,000
On expansion rollers per lineal inch 600 times the diameter of the roller in inches.		

(f) Combined Stresses. For combined stresses due to wind and other loads, the permissible working stress may be increased 33⅓ per cent, provided the section thus found is not less than that required by the dead and live loads alone.

(g) Members Carrying Wind Stress Only.. For members carrying wind stresses only, the permissible working stresses may be increased 33⅓ per cent.

6. Symmetry of Members. Structural members shall preferably be symmetrical. Where single angles have but one leg connected only 40 per cent of the area of the outstanding leg shall be considered as taking stress.

7. Beams and Girders. (a) Rolled beams shall be proportioned by the moment of inertia of their net section.

Plate girders with webs fully spliced for tension and compression shall be so proportioned that the unit stress on the net section does not exceed the stresses specified in Section 5 as determined by the moment of inertia of the net section.

(b) Plate Girder webs shall have a thickness of not less than $\frac{1}{160}$ of the unsupported distance between the flanges.

(c) Web splices shall consist of a plate on each side of the web capable of transmitting the full stress through the splice rivets.

(d) Stiffeners. Stiffeners shall be required on the web of rolled beams and plate girders at the ends and at points of concentrated loads, and at other points where *h* the clear distance between flanges is greater than $85\ t\sqrt{18{,}000\left(\frac{A}{S}\right)}-1$, in which *t* is the thickness of the web. When stiffeners are required, the distance in inches between them shall not be greater than $85\ t\sqrt{18{,}000\left(\frac{A}{S}\right)}-1$, but in no case greater than 6 feet. When *h* is greater than 60 times *t*, the thickness of the web of a plate girder, stiffeners shall be provided at distances not greater than 6 feet apart. Stiffeners under or over concentrated loads shall be proportioned to distribute such loads into the web.

Plate girder stiffeners shall generally be in pairs, one on each side of the web, and shall have a close bearing against the flange angles at points of concentrated loading; stiffeners over the end bearings shall be on plate fillers. The pitch of rivet in stiffeners shall not exceed 6 inches.

(e) Flange plates of all girders shall be limited in width so as not to extend more than 6 inches or more than 12 times the thickness of thinnest plate beyond the outer row of rivets connecting them to the angles.

(f) Crane runway girders and the supporting framework shall be proportioned to resist the greatest horizontal stresses caused by the operation of the cranes.

(g) Rivets connecting the flanges to the web at points of direct load on the flange between stiffeners shall be proportioned to carry the resultant of the longitudinal and transverse shears.

(h) Rivets connecting the flanges to the webs of plate girders and of columns subjected to bending shall be so spaced as to carry the increment of the flange stress between the rivets.

8. Column Bases. (a) Proper provision shall be made to distribute the column loads on the footings and foundations.

(b) The top surface of all column bases shall be planed for the column bearing.

(c) Column bases shall be set true and level, with full bearing on the masonry, and be properly secured to the footings.

9. Eccentric Loading. Full provisions shall be made for stresses caused by eccentric loads.

10. Combined Stresses. (a) Members subject to both direct and bending stresses shall be so proportioned that the greatest combined stresses shall not exceed the allowed limits.

(b) All members and their connections which are subject to stresses of both tension and compression due to the action of live loads shall be designed to sustain stress giving the largest section, with 50 per cent of the smaller stress added to it. If the reversal of stress is due to the action of wind, the member shall be designed for the stress giving the largest section and the connections proportioned for the largest stress.

11. Abutting Joints. Compression members when faced for bearings shall be spliced sufficiently to hold the connecting members accurately in place. Other joints in riveted work, whether in tension or compression, shall be fully spliced.

12. Net Sections. (a) In calculating tension members, the net section shall be used, and in deducting the rivet holes they shall be taken 1/8 inch greater in diameter than the nominal diameter of the rivets.

(b) Pin-connected tension members shall have the section through the pinhole 25 per cent in excess of the net section of the member, and a net section back of hole equal to 75 per cent of that required through the pinhole.

13. Rivets and Bolts. (a) In proportioning rivets the nominal diameter of the rivet shall be used.

(b) Rivets carrying calculated stresses, and whose grip exceeds five diameters, shall have their number increased 1 per cent for each additional 1/10 inch in the rivet grip. Special care shall be used in heating and driving such rivets.

(c) Rivets shall be used for the connections of main members carrying live loads which produce impact, and for connections subject to reversal of stresses.

(d) Finished bolts in reamed holes may be used in shop or field work where it is impracticable to obtain satisfactory power-driven rivets. The finished shank shall be long enough to provide full bearing, and washers shall be used under the nuts to give full grip when turned tight.

Unfinished bolts may be used in shop or field work for connections in small structures used for shelters, and for secondary members of all structures such as purlins, girts, door and window framing, alignment bracing and secondary beams in floor.

14. Rivet Spacing. (a) The minimum distance between centers of rivet holes shall be three diameters of the rivet; but the distance shall preferably be not less than 4½ inches for 1¼ inch rivets, 4 inches for 1⅛ inch rivets, 3½ inches for 1 inch rivets, 3 inches for ⅞ inch rivets, 2½ inches for ¾ inch rivets, 2 inches for ⅝ inch rivets, and 1¾ inches for ½ inch rivets. The maximum pitch in the line of stress of compression members composed of plates and shapes shall not exceed 16 times the thickness of the thinnest outside plate or shape, nor 20 times the thickness of the thinnest enclosed plate or shape with a maximum of 12 inches, and at right angles to the direction of stress the distance between lines of rivets shall not exceed 30 times the thickness of the thinnest plate or shape. For angles in built sections with two gage lines, with rivets staggered, the maximum pitch in the line of stress in each gage line shall not exceed 24 times the thickness of the thinnest plate with a maximum of 18 inches.

(b) In tension members composed of two angles, a pitch of 42 inches will be allowed, and in compression members, 24 inches, but the ratio $\frac{l}{r}$ for each angle between rivets shall not be more than ¾ of that for the whole member.

(c) The pitch of rivets at the ends of built compression members shall not exceed four diameters of the rivets for a length equal to 1½ times the maximum width of the member.

(d) The minimum distance from the center of any rivet hole to a sheared edge shall be 2¼ inches for 1¼ inch rivets, 2 inches for 1⅛ inch rivets, 1¾ inches for 1 inch rivets, 1½ inches for ⅞ inch rivets, 1¼ inches for ¾ inch rivets, 1⅛ inches for ⅝ inch rivets, and 1 inch for ½ inch rivets. The maximum distance from any edge shall be 12 times the thickness of the plate, but shall not exceed 6 inches.

15. Connections. (a) Connections carrying calculated stresses, except for lacing, sag bars, angles, hand rails, or beam connections, shall have not less than 2 rivets or bolts.

(b) Members meeting at a joint shall have their lines of center of gravity meet at a point if practicable; if not, provision shall be made for any eccentricity.

(c) The rivets at the ends of any member transmitting the stresses into that member shall have their centers of gravity in the line of the center of gravity of the member; if not provision shall be made for the effect of the resulting eccentricity. Pins may be so placed as to counteract the effect of bending due to dead load.

(d) When a beam or girder "A" is connected to another member in such a manner that "A" acts as a continuous or fixed end beam, proper provision shall be made for the bending moments at such a connection.

(e) Where stress is transmitted from one piece to another, through a loose filler, the number of rivets shall be properly increased, tight-fitting fillers shall be preferred.

(f) Welded connections shall be designed and used only for the transmission of shear stresses.

16. Lattice. (a) The open sides of compression members shall be provided with lattice having tie plates at each end and at the intermediate points if the lattice is interrupted. Tie plates shall be as near the ends as practicable. In main members carrying calculated stresses the end tie plates shall have a length of not less than the distance between the lines of rivets connecting them to the flanges, and intermediate ones of not less than one-half of this distance. The thickness of tie plates shall not be less than one-fiftieth of the distance between the lines of rivets connecting them to the

segments of the members and the rivet pitch shall not be more than four diameters. Tie plates shall be sufficient in size and number to equalize the stress in the parts of the members.

(b) Lattice bars shall have neatly finished ends. The thickness of lattice bars shall be not less than one-fortieth for single lattice and one-sixtieth for double lattice of the distance between end rivets; their minimum width shall be as follows:

For 15 inch channels, or built sections with 3½ inch and 4 inch angles—2¼ inches where ¾ inch rivets are used, or 2½ inches where ⅞ inch rivets are used.

For 12 inch, 10 inch and 9 inch channels, or built sections with 3 inch angles—2¼ inches where ¾ inch rivets are used.

For 8 inch and 7 inch channels, or built sections with 2½ inch angles, 2 inches where ⅝ inch rivets are used, or 2¼ inches where ¾ inch rivets are used.

For 6 inch and 5 inch channels, or built sections with 2 inch angles, 1½ inches where ½ inch rivets are used, or 1¾ inches where ⅝ inch rivets are used.

(c) The inclination of lattice bars to the axis of the members shall generally be not less than 45 degrees but when the distance between the rivet lines in the flanges is more than 15 inches, the lattice shall be double and riveted at the intersection if bars are used, or else shall be made of angles.

(d) Lattice bars shall be so spaced that the ratio $\frac{l}{r}$ of the flange included between their connections shall be not over ¾ of that of the member as a whole.

17. Expansion. Proper provision shall be made for expansion and contraction.

18. Minimum Thickness. No steel less than $\frac{5}{16}$ inch thick shall be used for exterior construction, nor less than ¼ inch for interior construction, except for linings or fillers and rolled structural I-beams and channels.

These provisions do not apply to light structures such as skylights, marquees, fire escapes, light one-story buildings, or light miscellaneous steel work.

Note: For minimum requirements for fire escape construction, see orders 5121 to 5131 inclusive of this code.

For trusses having end reactions of 35,000 pounds or over, the gusset plates shall be not less than 3/8 inch thick.

19. Adjustable Members. The initial stress in adjustable members shall be assumed as not less than 5,000 pounds.

20. Workmanship: (a) All workmanship shall be equal to the best practice in modern structural shops.

(b) Drifting to enlarge unfair holes shall not be permitted.

(c) The several pieces forming built sections shall be straight and fit close together; and finished members shall be free from twists, bends, or open joints.

(d) Rolled sections, except for minor details, shall not be heated, or bent cold unless the section is otherwise fully developed in an approved manner.

(e) Wherever steel castings are used, they shall be properly annealed.

(f) Punching. Material may be punched 1/16 inch larger than the nominal diameter of the rivets, whenever the thickness of the metal is equal to or less than the diameter of the rivets, plus 1/8 inch. When the metal is thicker than the diameter of the rivet, plus 1/8 inch, the holes shall be drilled, or sub-punched and reamed.

(g) Rivets are to be driven hot, and wherever practicable, by power. Rivet heads shall be of hemispherical shape and uniform size throughout the work for the same size rivet, full, neatly finished, and concentric with the holes. Rivets, after driving, shall be tight, completely filling the holes, and with heads in full contact with the surface.

(h) Compression joints depending upon contact bearing shall have the bearing surfaces truly faced after the members are riveted. All other joints shall be cut or dressed true and straight, especially where exposed to view.

(i) The use of a burning torch is permissible if the burned metal is not carrying stresses during the burning. Stresses shall not be transmitted into the metal through a burned surface.

21. Painting. (a) Parts not in contact, but inaccessible after assembling, shall be properly protected by paint.

(b) All steel work, except where encased in concrete, shall be thoroughly cleaned and given one coat of acceptable metal protection well worked into the joints and open spaces.

(c) Machine finished surfaces shall be protected against corrosion.

(d) Unless otherwise properly protected, all steel work shall after erection be protected by a field coat of good paint applied by a competent painter.

22. Erection. (a) The frame of all steel skeleton buildings shall be carried up true and plumb, and temporary bracing shall be introduced wherever necessary to take care of all loads to which the structure may be subjected, including erection equipment, and the operation of same. Such bracing shall be left in place as long as may be required for safety.

(b) As erection progresses the work shall be securely bolted up to take care of all dead load, wind and erection stresses.

(c) Wherever piles of material, erection equipment, or other loads are carried during erection, proper provision shall be made to take care of stresses resulting from the same.

(d) No riveting shall be done until the structure has been properly aligned.

(e) Rivets driven in the field shall be heated and driven with the same care as those driven in the shop.

SECTION 7. WOOD CONSTRUCTION.

Order 5317. Unit Stresses. The following unit stresses (pounds per square inch) shall not be exceeded.

	Tension		Compression		Transverse	Shear
	With grain	Across grain	With grain	Across grain	Extreme fibre	With grain
White oak	1,200	125	1,100	500	1,500	150
White pine	700	50	900	200	1,000	80
Long leaf yellow pine	1,200	60	1,500	350	1,700	150
Short leaf yellow pine	1,000	50	1,100	300	1,400	100
Douglas fir	1,000	50	1,300	325	1,600	110
Norway pine	800	50	1,000	250	1,200	100
Eastern spruce and fir	800	50	800	200	1,000	80
Hemlock	600	--------	900	200	1,100	80

The stress in compression members shall not exceed $C\left\{1-\frac{L}{60D}\right\}$ where

C="compression with grain"
L=length in inches
D=least width in inches

Note (a). The above are maximum stresses, suitable for timber which is free from injurious defects and of sufficient density.

Defects include decay, knots, shakes, checks, etc. Decay is dangerous because it tends to spread and because it is difficult to determine the extent to which the timber is weakened. Knots and cross grain in the center half of beams near the bottom edge are specially serious. Deep checks and ring shakes are of importance when they occur in the middle half of the height of the beam or when they run diagonally across the faces; for beams containing such checks, the allowable stress in horizontal shear should be decreased.

The density of the wood is important because the strength of timber increases with the density; this in turn is in porportion to the per cent of "summerwood" (i. e. the hard, dark part of the ring). In yellow pine and Douglas fir the summerwood should form at least 25 per cent of the total if the above stresses are to be used.

These stresses should be decreased at least 20 per cent for timber exposed to moisture.

For further details on the strength and grading of timbers, see Bulletin 108, circular 295 and other publications of the U. S. Forest Service.

Note (b). All lumber and timber should conform in size and grade to the American Lumber Standard, a copy of which may be secured from lumber dealers or from the Industrial Commission.

Order 5318. Stud Partitions. Studs in a bearing wall shall be not less than 1⅝ x 3⅝ inches, with the 3⅝ inch dimension at right angles with the plane of the wall. Wooden stud partitions and walls shall be capped with a two inch plate below the floor joists; or if the studs run through, pieces of studding shall be fitted in between so as to form a fire stop. No lath shall extend through from room to room.

For "semi-fire proof" stud partitions see order 5112.

Order 5319. Furring for Walls. When walls are furred, unless the wall between joists is built out to the face of lath, there shall be a continuous horizontal strip placed close to the joists at top and bottom; and before the lathing is done, the wall shall be plastered with a coat of mortar at least 6 inches wide and of the full thickness of the strip, just above or below each horizontal strip. Wooden lath or furring shall not be used in any building of fireproof or mill construction.

Order 5320. Floor and Roof Beams. The ends of all wooden floor or roof beams or joists which rest on a masonry wall shall enter the wall to the depth of 4 inches, unless wall hangers are used or unless the wall is properly corbeled out 4 inches, in which case the corbeling shall extend to top of joists.

Walls shall be anchored to the floor and roof construction with iron or steel wall anchors placed not more than 8 feet apart.

The ends of all such beams or joists shall be so shaped or arranged that in case of any deflection, or breaking, they may fall out without doing much injury to the brick wall. All joists entering any brick or stone wall shall be splayed approximately 3 inches shorter at top edge.

No wooden beam or other timber shall be built into a party wall nearer than 2 inches to the center of the wall.

SECTION 8. HOLLOW TILE AND CONCRETE BLOCK.

Order 5330—Definitions.

1. **By Clay Tile** is meant hollow clay or shale building units having parallel cells.

2. **By Concrete Block** is meant hollow building units, including concrete block, concrete tile and similar units, made of Portland cement concrete.

3. **The Shell** of clay tile or concrete block is the four outer walls of the unit.

4. **The Webs** of the clay tile or concrete block are the partitions within the shell dividing the unit into cells.

5. **The Cells** are the open or hollow spaces in a clay tile or concrete block.

6. **The Scoring** is the grooving in the outer face of the shells made to secure bond with mortar, concrete or other covering.

Order 5331—Clay Tile Used in Bearing and Exterior Walls.

1. **Weight.**

The weight of hollow clay tile used in exterior or bearing walls shall be not less than the following:

Cells Vertical

Dimension	No. Cells	Standard Weights
3¾ x 12 x 12	3	20
6 x 12 x 12	6	30
8 x 12 x 12	6	36
10 x 12 x 12	6	42
12 x 12 x 12	6	48
12 x 12 x 12	9	52

Cells Horizontal

Dimension	No. Cells	Standard Weights
3¾ x 5 x 12	1	9
5 x 8 x 12	2	16
5 x 8 x 12	3	16
5 x 8 x 12 (L-Shaped)	4	16
6¼ x 8 x 12 (T-Shaped)	4	16
7¾ x 8 x 12	6	24
8 x 10¼ x 12 (H-Shaped)	7	32

No such individual tile shall vary more than 5 per cent under the weights given above.

2. Shape and Structure.

All clay tile used in exterior or bearing walls shall be well burned and free from cracks and other defects which interfere with the proper setting of the tile, or impair the strength of permanence of the construction.

The depth of curvature or warpage of any face or web shall not exceed 3 per cent of the greatest dimension of such face or web, but in no case more than ¼ inch.

The dimensions of clay tile shall be within 3 per cent of the dimensions given in the above table of sizes and weights of standard tile.

3. Strength.

All clay tile used in exterior or bearing walls shall have compressive strength as follows:—

> When tested with cells horizontal not less than 700 pounds per square inch gross area of bearing face.
>
> When tested with cells vertical not less than 1200 pounds per square inch gross area of bearing face.

The average strength of any group of specimens of clay tile shall be not less than the above requirements. The strength of individual tile shall not vary more than 5 per cent below the above requirements.

Where one or more vertical faces of a tile are scored the gross area of a bearing face is determined by measuring from out to out of plain shell faces and ridges.

4. Absorption and Durability.

Clay tile used in bearing walls and in walls exposed to the weather shall absorb moisture in the one hour boiling test not to exceed 16 per cent of the dry weight of the specimen.

5. Branding.

All clay tile shall be branded with a distinctive indentation on the shell. Clay tile which comply with all requirements for exterior construction and bearing walls shall have the word BEARING impressed on them.

All clay tile shall bear the name, initials or trade-mark of the manufacturer.

6. Tests.

Typical specimens of all sizes and designs of clay tile used in exterior or bearing walls shall be tested in an approved manner, originally to prove compliance with the requirements of this code, and thereafter as directed by the Industrial Commission.

Note: A list of clay tile which have been approved, also specification describing the approved manner of making tests, may be obtained from the Industrial Commission.

Order 5332—Concrete Block Used in Bearing and Exterior Walls.

1. Strength.

All concrete blocks used in exterior or bearing walls shall have a compressive strength of not less than 700 pounds per square inch gross area as laid in the wall.

The average strength of any group of test specimens of concrete block shall be not less than the above requirements. The strength of individual test specimens shall not vary more than 5 per cent below the above requirements. These compressive strength values shall be developed in a proper atmosphere and in a curing period of not more than 28 days from the date of manufacture.

2. Absorption of Moisture and Durability.

Concrete block used in walls directly exposed to the weather shall absorb moisture in the immersion test not to exceed 12 per cent of the dry weight of the specimen, except that where the net weight of a concrete block is less than 140 pounds per cubic foot the absorption of moisture in per cent of dry weight shall not exceed the quotient of 12 times 140 divided by the net weight of the concrete block in pounds per cubic foot.

3. Branding.

All concrete blocks used in exterior or bearing walls shall be branded with a distinctive indentation or waterproof stencilled mark, and shall bear the name, initials or trademark of the manufacturer.

4. Tests.

Typical specimens of all sizes and designs of concrete block used in exterior or bearing walls shall be tested in an approved manner, originally to prove compliance with the requirements of this code, and thereafter at intervals of not more than one year. Further tests may be demanded at any time there is reasonable suspicion of nonconformance to the requirements of this code.

Note: A list of concrete blocks which have been approved, also a specification describing the approved manner of making tests, may be obtained from the Industrial Commission.

Order 5333—Use of Clay Tile and Concrete Blocks in Bearing and Exterior Walls.

Approved clay tile and concrete blocks may be used in bearing and exterior walls of buildings not more than 3 stories, or 45 feet in height, or in panel walls in buildings of any height.

Concentrated loads shall be transmitted to clay tile or concrete block masonry by plain concrete, reinforced concrete, or solid masonry.

Where clay tile or concrete blocks are used in party walls there shall be not less than two such units used in making up the thickness of the wall unless solid masonry is used for building all chases, recesses, framing of all openings, and for the support, anchorage and protection of all joists and beams carried into such wall.

Where a single unit of masonry does not constitute the full thickness of the wall the bonding of units shall be by masonry only. Where a brick facing, or backing, is used the bond shall consist of a full header course of brick every sixth course of brick, or equivalent. Where the facing or backing is also of clay tile, or concrete block, the bond courses shall be placed at intervals of not more than 16 inches.

Clay tile and concrete blocks used in bearing walls shall be well bedded in mortar. The net bearing area of all clay tile and concrete blocks as laid in the wall shall be such that the allowable unit stress on the mortar is not exceeded.

All clay tile laid with cells vertical shall be laid in Portland cement or natural cement mortar. All clay tile laid with cells horizontal and all concrete blocks shall be laid in cement-lime, or better, mortar.

Order 5334—Clay Tile Used in Non-Bearing Partitions.

1. Weight.

The weight of hollow clay tile used in non-bearing partitions shall be not less than the following:

Dimension	No. Cells	Standard Weights
3 x 12 x 12	3	15
4 x 12 x 12	3	16
6 x 12 x 12	3	22
8 x 12 x 12	4	30
10 x 12 x 12	4	36
12 x 12 x 12	4	40

No individual tile shall vary more than 5 per cent under the weight given above.

2. Shape and Structure.

All hollow clay tile used in non-bearing partitions shall be well burned and reasonably free from defects which would interfere with the proper setting of the tile, or impair the permanence or fire protection value of the construction.

The depth of curvature or warpage of any face, shall not exceed 3 per cent of the greatest dimension of such face, but in no case more than 1/4 inch.

The dimensions of hollow clay tile used in non-bearing partitions shall be within 3 per cent of the table of sizes and weights of standard partition tile.

3. Branding.

All hollow clay tile used in non-bearing partitions shall be branded with a distinctive indentation. All hollow clay tile not suitable for use in bearing and exterior walls but used in non-bearing partitions shall have the word PARTITION impressed on them.

All hollow clay tile used in partition work shall bear the name, initials or trade-mark of the manufacturer.

Order 5335—Concrete Block Used in Non-Bearing Partitions.

1. General Requirements.

All concrete blocks used in non-bearing partitions shall comply with the requirements for use in bearing and exterior walls, or shall be branded with a distinctive impression to identify them for use only in non-bearing partitions.

Order 5336—Clay Tile and Concrete Blocks Used in Floor Construction.

1. General Requirements.

Where hollow clay tile or concrete blocks are used in concrete floor construction in a way that the whole or any portion of a tile or block is subjected to a load, the requirements which apply to tile or block used in exterior and bearing construction shall be complied with.

Where hollow clay tile or concrete blocks are used in concrete floor construction in a way that no portion of a tile is subjected to a load, the requirements which apply to tile used in partitions shall be complied with.

2. Branding.

All clay tile or concrete blocks used in floor construction shall bear the name, initials or trade-mark of the manufacturer.

Part V

FACTORIES, OFFICE AND MERCANTILE BUILDINGS

The requirements of the following sections apply to buildings of this classification only.

For other general requirements see Parts I to IV.

SECTION 1. CLASSIFICATION.

Order 5400. This Classification includes all factories and workshops (including all places where manual labor is employed), office buildings, telegraph and telephone offices, mercantile establishments where commodities are bought or sold, warehouses, railroad stations, exhibition buildings, and places where less than 100 persons assemble for entertainment, worship, or dining purposes.

SECTION 2. EXITS.

Order 5401. Number and Location. Every building and every story thereof shall have at least two exits, with the following exceptions:

(1) First and second story storage rooms not over 3,000 square feet in area;

(2) The second story of a two story building, provided such story is used only for offices; is not over 3,000 square feet in area; and has a stairway enclosed with fireproof or semi-fireproof partitions, leading directly to the outside and not leading to the basement.

Additional exits shall be provided, if necessary, so that no part of the building will be more than 75 feet distant from an exit, measuring along public passageways and aisles; but such distance may be increased to 100 feet in the the following buildings, provided no hazardous condition exists therein:

(1) Fireproof buildings whose contents are entirely or almost entirely noncombustible;

(2) Fireproof office buildings;

(3) Fireproof storage warehouses with fireproof individual compartments;

(4) Buildings having an approved automatic sprinkler system, provided the contents are not especially inflammable.

Exits shall be so located as to afford the best possible egress.

Order 5402. Type of Exits. At least one-half of the exits above required shall be stairways (see orders 5117-5119). The other exits shall be either stairways, or horizontal exits (order 5120), or fire escapes (orders 5121-5131). But no fire escape shall be accepted as an exit from any floor which is more than 60 feet above the grade at the point where such fire escape is located, except that such height may be increased to 90 feet in the case of fireproof office buildings or fireproof buildings where such floors are used for storage only. In a two story building, an outside wooden stairway may be used as an exit.

Every building which accommodates more than 50 persons above the second floor shall have at least two exits other than fire escapes, excepting fireproof office buildings and other fireproof buildings whose contents are entirely or almost entirely incombustible, provided such building does not exceed 7,000 square feet in floor area at the third floor.

Order 5403. Enclosures of Stairways. In all buildings having a greater number of stories than the number given in the following table, all stairways shall be enclosed as specified in orders 5115 and 5116:

	Non-fireproof, not sprinklered	Either fireproof or sprinklered	Fireproof and sprinklered
Office buildings: other buildings whose contents are practically incombustible	3	4	5
All other factories, stores, and other business buildings	2	3	4

Exceptions. (1) A three story mercantile building having at least two stairways may have one stairway unenclosed provided such stairway does not lead to the basement.

(2) A fireproof building having at least two stairways may have one stairway unenclosed from the first to the third (or second) floor, provided such stairway

is enclosed in the third (or second) story and does not lead to the basement.

(3) Stairways must be enclosed in all buildings of more than two stories where inflammable material or any other especially hazardous condition is present.

A fire escape shall be provided on every building of more than two stories which does not have at least two enclosed stairways, or one enclosed stairway and a horizontal exit.

One enclosed stairway may serve as an exit for two divisions of a building if each division has a door opening directly into the stairway enclosure; provided each division shall have at least two means of reaching the ground, either directly or indirectly.

Order 5404. Total Width. In a building not provided with horizontal exits, the total width of stairways shall be not less than the following:

In ordinary or frame buildings, 60 inches per 100 persons; if sprinklered, 40 inches per 100 persons.

In fireproof and mill buildings:

	Fireproof Sprinklered	Fireproof not Sprinklered	Mill Sprinklered	Mill not Sprinklered	
--------	30	50	40	60	in. per 100 persons on 2nd floor
plus----	15	25	20	30	in. per 100 persons on 3rd floor
plus----	12	20	10	24	in. per 100 persons on 4th floor
plus----	9	15	12	18	in. per 100 persons on 5th floor
plus----	6	10	8	12	in. per 100 persons on 6th floor
plus----	3	5	4	6	in. per 100 persons on 7th floor
plus----	0	0	0	0	in. per 100 persons on 8th and above
	but in no case shall such total width be less than				
	30	50	40	60	in. per 100 persons on any one floor.

Standard fire escapes (orders 5121-5131) may be substituted for stairways to the extent of not more than one-third of the required total width, subject to the provisions of order 5402.

If horizontal exits (order 5120), are provided for any floor, the number of persons accommodated on such floor may be increased at the rate of 100 persons for each 40 inches width of such exits, provided such increase shall not exceed 100 per cent of the number of persons accommodated by the stairways.

Example. As examples of calculations under this order where the same number of persons are to be accommodated on each floor, the following table shows the number accommodated by two stairways of minimum width (each 44 inches wide):

Frame and ordinary buildings, 147 persons total, above first story; if sprinklered, 220 persons.

Fireproof and mill buildings:

Height of building	Fireproof Sprinklered	Fireproof not Sprinklered	Mill Sprinklered	Mill not Sprinklered	
2 stories	293	175	220	147	Persons on each floor
3 stories	195	117	147	98	Persons on each floor
4 stories	154	92	116	77	Persons on each floor
5 stories	133	80	100	67	Persons on each floor
6 stories	122	73	92	61	Persons on each floor
More than 6 stories	117	70	--------	--------	Persons on each floor

Where one minimum stairway and one "A" fire escape are provided, take ¾ of the above numbers; subject to the limitations of order 5402.

See the Note on Exits, p. 22.

Order 5405. Capacity of Buildings. In calculating the aggregate width of exits, the capacity of building shall be established as follows:

In wholesale mercantile establishments and warehouses, by the number of persons employed therein plus an equal number of customers.

In dining rooms, cafes, and lunch rooms, by allowing 15 square feet of floor per person. If the room accommodates more than 100 persons see order 5501.

In retail mercantile establishments and exhibition halls, the capacity shall be determined by the architect or owner and no greater number of persons shall be permitted therein; but such number shall in no case be less than one person per 60 square feet of gross floor area excluding elevators and stairways.

In all other buildings, the capacity shall be determined by the actual number of persons liable to be engaged therein and no greater number of persons shall be permitted therein. See order 5415.

Order 5406. Exit Doors. Every door which serves as an exit from a room accommodating more than ten persons (as well as doors which are exits from public passageways or stairways) shall be a standard exit door as defined in order 5132 except that such exit door need not swing outward if it accommodates less than 25 persons and is not located at the foot of a stairway, and is not more than four risers above the outside grade. Over every emergency exit door, and over every exit door where other doors or openings may cause confusion, a sign shall be placed bearing the word "Exit" or "Out" in plain letters at least 5 inches high. For red lights see order 5132.

Order 5407. Passageways. Every public passageway or aisle leading to or from a stairway, fire escape, or exit door, shall conform in width to the rule for width of stairways (order 5404). The required width shall be kept clear and unobstructed at all times. Where loose chairs or seats would be liable to cause confusion or obstruction, such chairs or seats must be fastened.

SECTION 3. SCUTTLE.

Order 5408. Every building or section of a building two stories or more in height shall have a permanent means of access to the roof from the inside. The opening shall be not less than 20 by 30 inches and there shall be a permanent ladder or stairway leading thereto.

SECTION 4. TRAP DOORS AND FLOOR OPENINGS.

Order 5409. Every opening through any floor shall be guarded by a substantial enclosure or rail at least 3 feet high. Floor openings in buildings of more than two stories, unless enclosed with standard fireproof enclosures, shall be protected by standard fire doors, except that two stories may be connected by openings without fire doors if their combined floor area does not exceed the permissible floor area according to order 5202.

SECTION 5. LIGHTING.

Order 5410. All passageways and stairways when used at night shall have lights at the head and foot of each flight of stairs, and at the intersections of all corridors and passageways. Where "B" fire escapes are required, such fire escapes shall be lighted whenever the stairways are required to be lighted. For red exit lights see order 5132.

All gas jets or gas lights in factories or workshops where combustible material is used, shall be properly enclosed by globes or wire cages, or otherwise properly guarded. See also orders 5224-5225.

Note. For further requirements on lighting see Industrial Lighting Code for Factories, Mills, Offices, and other Work Places issued by the Industrial Commission.

SECTION 6. TOILET ROOMS, LAVATORIES AND DRESSING ROOMS.

Note. The following orders 2203, 2213, 2214, 2215, 2217, and 2218 are taken from the General Orders on Sanitation issued by the Industrial Commission. For further requirements on ventilation and sanitation see that publication.

Order 2203. Number of Closets and Urinals. In every place of employment, whether heretofore or hereafter constructed, one water-closet shall be provided for every 20 persons, or fraction thereof, of either sex.

In addition thereto, where more than 10 males are employed, one urinal shall be provided for every 40 males, or fraction. Where not more than 10 males are employed, either a urinal shall be provided or the water-closet shall have a projecting lip and self-rising seat. Where trough urinals are used, each two feet of trough shall constitute one urinal.

Also see orders 5250 to 5265, inclusive.

Order 2213. Toilet Room, Lavatories. Adequate washing facilities shall be provided in or near every toilet room. In new installations there shall be at least one lavatory for every five fixtures (closets and urinals) or fraction.

Note. One lavatory for every two or three fixtures is recommended

Order 2214. Shop Lavatories. Adequate washing facilities shall be provided (1) in all industries where lead, arsenic, or other poisonous or injurious materials are handled by the employes, and (2) in industries where food is prepared or manufactured, and (3) in glue factories, foundries, machine shops and other industries where the employes' hands become dirty or greasy, except that in industries of the last mentioned class, located in small towns, where the employes go home at noon, this requirement may be waived by the Industrial Commission. In new installations there shall be at least one lavatory for every ten employes, or fraction, and hot water shall be provided. Basins or troughs for common use are prohibited.

Notes. (1) Washing facilities where the employe must necessarily wash in running water, are recommended. A large trough without stopper, where each person washes in running water from an individual faucet, is generally better than separate bowls.

(2) One lavatory or faucet for every five employes is recommended.

(3) Adequate washing facilities are recommended for all industries.

(4) Wash rooms should be constructed according to the requirements for toilet rooms, as far as possible.

Order 2215. All lavatories must be made of porcelain, enameled iron, or other impervious material.

Order 2217. Drinking Water. Each place of employment must be supplied with sufficient pure drinking water and the faucets or outlets for same must be placed convenient to the employes. Common drinking cups are prohibited. Sanitary drinking fountains must be installed or individual cups must be provided by the employer.

Order 2218. Dressing Rooms. Dressing rooms shall be provided where women are employed in factories, stores, laundries, restaurants, and telephone, telegraph, express and railroad offices. Every dressing room shall be properly lighted, ventilated, and heated.

SECTION 7. STANDPIPES, FIRE EXTINGUISHERS AND SPRINKLERS.

Order 5411. Standpipes and Extinguishers. For exterior standpipes see order 5130.

Standard interior standpipes (order 5134) shall be provided in all buildings of more than two stories and more than 3,000 square feet undivided floor area, where inflammable material or any other hazardous condition is present, unless an approved automatic sprinkler system is provided. The hose shall be long enough to reach to all parts of the building, but no longer than 100 feet.

Note. The term "inflammable" is applied to objects which are not only combustible (i. e., can be burned) but which will burn readily and rapidly.

Wherever water supply of sufficient pressure is not available, two standard fire extinguishers (order 5135) shall be provided on each floor in place of each required interior standpipe.

Order 5412. Automatic Sprinklers. A complete automatic sprinkler system (order 5136) shall be provided in every building of this classification (except office buildings not used for mercantile purposes) where more than 50 persons are employed or accommodated above the third story except as provided below.

In every such building where more than 50 persons are accommodated above the second story, an automatic sprinkler system shall be provided in the basement and sub-basements, except where there is no city water supply.

An office building in which one or more of the lower floors is used for mercantile purposes, shall be classed as a mercantile building, except that no sprinklers will be required in such portions of the building as are used for offices only.

No sprinklers will be required in a building of fireproof construction whose contents are not readily combustible.

See also notes following order 5136.

SECTION 8. FIRE ALARM.

Order 5413. An approved fire alarm system shall be provided in every factory or workshop where more than 10 persons are employed above the second story, except buildings which are provided with a complete automatic sprinkler system, and except fireproof buildings whose contents are practically incombustible.

SECTION 9. NOTICE OF LOADS AND PERSONS ACCOMMODATED

Order 5414. Floor Loads. In every factory, workshop, warehouse, or other building where material is piled, notices of a permanent character shall be painted or otherwise prominently displayed, stating the live load (pounds per square foot) which the floor is designed to carry. Such notices shall be placed in full view, on each floor.

Note. In many cases, where floors are used for the storage of some particular material, additional safety may be secured by marking on the wall the height to which the material may be piled without exceeding the safe load.

Order 5415. Number of Persons. In all buildings of this classification where 50 or more persons are accommodated on any floor above the second, notices shall be prominently displayed stating the maximum number of persons on each floor for whom stairways and other exits have been provided according to orders 5401-5405. Such notices shall be placed in full view, on each floor.

HEATING AND VENTILATION

For heating and ventilation in factories, office and mercantile buildings, etc., see the Heating and Ventilation Code issued by the Industrial Commission, which code applies to all public buildings and places of employment.

ELEVATORS AND ELEVATOR ENCLOSURES.

For requirements governing the installation and operation of elevators, and the construction and protection of elevator shaftways, see the Elevator Code issued by the Industrial Commission, which code applies to all public buildings and places of employment.

Part VI

THEATERS AND ASSEMBLY HALLS

The requirements of the following sections apply to buildings of this classification only.

For other general requirements, see Parts I to IV.

For assembly halls in schools, see also order 5614.

SECTION 1. CLASSIFICATION.

Order 5500. Theatres. This classification includes all buildings or parts of buildings used for theatrical, operatic or motion picture performances of a public nature, except as provided in the following order.

Order 5501. Assembly Halls. This classification includes all buildings or parts of buildings not included under "theaters," where 100 or more persons assemble for entertainment, instruction, worship or dining purposes.

A private assembly hall is one built in connection with a school, club, church, or society building, and used only for private gatherings, and not rented for public use. Every other assembly hall is a public assembly hall.

Occasional private motion picture performances may be given in a private assembly hall, but in all such cases a fireproof booth must be provided according to orders 5538-5546.

Occasional private theatrical or operatic performances may be given in a private assembly hall; but in all such cases the stage must be protected as in orders 5519-26, 5533-34.

Occasional motion picture or theatrical performances (not over twice a week) may be given in a public assembly hall which is located on the first floor, accommodates not over 300 persons, and is situated in a community of not over 500 population having no regular theater; in all such cases a fireproof booth must be provided and the stage must be protected as in orders 5519-5526, 5533, 5534, 5538-5546. No place of assemblage shall be located over any such assembly hall.

SECTION 2. HEIGHT AND CLASS OF CONSTRUCTION.

Order 5502. Theatres. The main entrance or entrances shall not be at a higher level than 3 steps of 6 inches each, above the sidewalk at that point. The floor level at the highest row of seats, on the main floor, shall not be more than 6 feet above the sidewalk level at the main entrance; and the floor level at the lowest row of seats, on said floor, shall not be more than 6 feet below the level of the adjoining sidewalk.

But this requirement shall not apply to a "general purpose building" or village hall, in which the first story is used for village offices, fire department, etc., the second story is used as an assembly hall and also for motion picture performances; provided

(1) The building shall not be nearer than 10 feet to any other building or lot line;

(2) Not more than 400 persons shall be accommodated in the hall or theater;

(3) The width of exits shall be 20 per cent greater than hereafter provided, (i. e., at least 48 inches per 100 persons);

(4) The stairways shall lead directly to the street and shall be enclosed with fireproof or semi-fireproof partitions (orders 5109-5112).

Theaters which accommodate not more than 500 persons shall be of ordinary construction or better.

Theaters which accommodate more than 500 persons shall be of fireproof construction; except the stage floor, which shall be of fireproof or mill construction (steel beams need not be fireproofed); and except the roof, which may be of wood but must have an incombustible roof covering. If the theater accommodates more than 1,000 persons, the roof shall be incombustible throughout.

Balconies and galleries which accommodate more than 100 persons shall be of fireproof construction.

Order 5503. Assembly Halls. Assembly halls which accommodate more than 1,000 persons shall be of fireproof construction. Balconies and galleries which accommodate more than 150 persons shall be of fireproof construction. Assembly halls which accommodate not more than 1,000 persons shall be of ordinary construction or better, except as follows:

Assembly halls accommodating not more than 750 persons may be built of frame construction provided the following conditions are complied with:

(1) The entire building shall not be more than one story high nor more than 6,000 square feet in area.

(2) The foundation walls and piers shall be of incombustible construction.

(3) The building shall be at least 10 feet away from any other building or adjoining lot line.

(4) The balcony shall not accommodate more than 100 persons and the balcony stairway shall lead directly to an outside door.

Every assembly hall accommodating more than 750 persons shall have the highest point of the main auditorium floor not more than 8 feet above, and in no case below, the grade line at the main entrance; except that in a building of fireproof construction, the highest point of such auditorium floor shall not be more than 15 feet above such grade.

An assembly hall accommodating not more than 750 persons and with not more than one balcony, may be placed in the second story of a building of fireproof construction provided the highest point of the main auditorium floor is not more than 22 feet above the grade at the main entrance of the building.

An assembly hall accommodating not more than 400 persons and with not more than one balcony, may be placed in the third story of a building of fireproof construction, provided the highest point of the main auditorium floor is not more than 35 feet above the grade at the main entrance to the building.

In a one story assembly hall with not more than one tier of balconies the roof and ceiling may be of combustible construction.

An assembly hall accommodating not more than 400 persons and with no balcony may be placed on the second floor of a building of ordinary or mill construction, provided the highest point of the floor is not more than 22 feet above the grade at the main entrance of the building.

An assembly hall accommodating not more than 200 persons and with no balcony, may be placed in the third story of a building of ordinary or mill construction, provided the floor level is not more than 35 feet above the grade at the main entrance of the building; or may be placed in any story of a building of fireproof construction. See also order 5615.

In the case of a private assembly hall, each of the above numbers of persons may be increased 25 per cent.

Where not less than two smokeproof stair towers, or one smokeproof stair tower and one horizontal exit are provided, assembly halls accommodating not more than 1000 persons (on basis of Order 5506) may be placed in the fourth story of a building of fireproof construction, and in higher stories in such buildings if the capacity is reduced 100 persons for every story above the fourth.

A roof garden accommodating not more than 1000 persons and used for dining or dancing purposes only may be placed on the roof of a fireproof building if not less than two widely separated and plainly designated smokeproof stair towers are provided.

A roof garden is an assembly hall located on the roof of any building having at least one half of the floor area either open to the sky or covered with glass and metal sky light construction.

SECTION 3. EXPOSURE AND COURTS.

Order 5504. The wall containing the main entrance to any theater or public assembly hall shall abut on a street. The lobby or passageway leading from the main entrance to the main auditorium door shall not be longer than 50 feet nor longer than three times its width, unless it is enclosed with unpierced fireproof ceiling and floor and with an unpierced standard fire wall on each side, but if the theater or assembly hall accommodates not more than 500 persons, such passageway shall be enclosed with unpierced fireproof or semi-fireproof ceiling, floor and partitions.

Every theater or public assembly hall which accommodates more than 300 persons shall have at least three walls abutting on streets, alleys, or open courts, except as follows:

(1) If the building is not more than 100 feet long, and each aisle leads directly to an exit at the rear, then no side court will be required.

(2) If the building is not more than 40 feet wide, and there is a cross aisle leading to a side exit at in-

tervals no greater than every fifteenth row, then only one side court will be required.

(3) If the first floor is fireproof and not more than 500 persons are accommodated, then only one side or rear court will be required.

The width of every exit court shall be at least 6 feet if the total seating capacity is not over 500 persons, and shall be increased at the rate of one foot per 500 persons additional. Every such court shall lead to a public thoroughfare, either directly, or through a passageway of equal width, not less than 8 feet high, and having unpierced standard fire walls, and fireproof ceiling and floor designed for a live load of at least 150 pounds per square foot. No such court or passageway shall be used for storage or any other purpose whatsoever, except for egress and ingress.

SECTION 4. BUILDINGS USED FOR OTHER PURPOSES.

Order 5505. No sleeping room or apartment shall be placed over a theater which has a stage unless the entire building is of fireproof construction.

No assembly hall shall be placed over a garage, unless separated therefrom by an unpierced fireproof floor.

Every theater or assembly hall built in connection with or as a part of a building used for other purposes, shall be separated from such other parts of the building by standard fire walls, except in the following cases:

(1) fireproof private assembly halls.

(2) non-fireproof private assembly halls accommodating not more than 400 persons.

(3) halls in fireproof hotels accommodating not more than 400 persons.

(4) in non-fireproof buildings, standard fireproof partitions (order 5109) may be used instead of fire walls.

SECTION 5. CAPACITY.

Order 5506. The capacity of a theater or assembly hall shall be established by the actual number of permanently fixed seats, plus an allowance of one person for every 3 square feet where "standing room" is provided. Such "standing room" shall not include any aisle, passageway, or lobby. Where permanently fixed seats are not provided, the capacity shall be established by allowing 15 square feet of clear floor space per person in halls used as dining or dance halls only, or 6 square feet per person in all other halls. See order 5513.

No greater number of persons than the number thus established shall be permitted in any theater or assembly hall.

SECTION 6. EXITS.

Order 5507. Number and Location. Every theater and assembly hall shall have two or more exits, placed as far apart as practicable, and so located that if any exit is blocked, some other exit will still be accessible from every part. Theater exits shall be distributed on all open sides of the building. (See orders 5504 and 5512.)

This order shall apply separately to the main floor and to each balcony or gallery which seats more than 50 persons, if in a theater; or more than 100 persons, if in a non-fireproof assembly hall; or more than 150 persons, if in a fireproof assembly hall; also to the stage, dressing room section, and other employe's room.

Order 5508. Type of Exits. Exits from the first floor shall be standard exit doors with incline or steps to grade; if the doorsill is below grade, an incline shall be used, except that a private assembly hall may have a stairway exit, from subgrade, of not more than ten risers in all. No part of any incline shall have a rise of more than one foot in five. Exits from upper floors, balconies, and galleries shall be stairways (orders 5117-5119), horizontal exits (order 5120), fire escapes or inclines.

Order 5509. Stairways. Every stairway in a theater, public assembly hall, or non-fireproof private assembly hall, except stairways from the main floor to the first balcony, shall be enclosed as in orders 5115 or 5116. No storage closet shall be placed under any stairway.

Stairways and steps which have more than three risers shall have handrails on both sides. See order 5118.

Every stairway used by the public in a theater or public assembly hall, shall have a uniform rise of not more than 7½ inches and a uniform tread of not less than 10 inches, measuring from tread to tread and from riser to riser; no winders shall be used; there shall not be less than three nor more than sixteen risers in any run. For other stairs see order 5119.

Order 5510. Fire Escapes. All fire escapes shall be "B" fire escapes (orders 5121-5131) except that "A" fire escapes may be used for balconies which accommodate not more than 100 persons.

Note. Fire escape stairways with solid platforms and treads, and covered by a roof, are recommended. Such stairways may be used as regular exits, thus adding to the comfort of the audience and also decreasing the danger of panic.

Order 5511. Exit Doors. Every required exit door (whether usual or emergency) shall be a standard exit door (order 5132).

No single door or leaf to a double door, shall be more than 4 feet wide. No two doors shall be hinged together.

No rolling, sliding or revolving door shall be counted as an exit from any theater or assembly hall, nor shall any such door be permitted in any theater where it would be liable to be used by the public as an exit.

Sills at all exits shall be level and flush with adjacent inside floors, and such floors shall extend without break in the level or gradient for a distance not less than the width of the adjacent aisle.

For exit lights and signs see order 5530—1.

Order 5512. Width of Exits. The total width of exits from every theater and assembly hall, and from every part thereof, shall be at not less than the following rates:

Theaters, non-fireproof, 40 inches per 100 persons.

Theaters, fireproof (except roof), 36 inches per 100 persons. In theaters, the width of the front entrance or entrances shall be approximately one-half of the total required width.

Assembly halls, non-fireproof, 36 inches per 100 persons.

Assembly halls, fireproof, 30 inches per 100 persons.

SECTION 7. SEATS.

Order 5513. All seats, chairs and benches shall be placed not less than 32 inches for adults, or 30 inches for minors, from back to back measured horizontally; except that folding seats of approved design, with backs not more than ½ inch thick, also fixed seats on an approximately level floor in an assembly hall, may be placed not less than 30 inches back to back, for the use of adults as well as minors. If benches without arms between seats are used, the seating capacity shall be established by allowing one sitting or seat to each 18 inches of length.

All seats, chairs and benches, except chairs in boxes or loggias, shall be securely fastened to the floor; or if the floor is level, the seats or chairs may be fastened together in groups of four or more.

Note. Loose chairs or seats must not be used unless a special permit is secured from the Industrial Commission, or from the Fire Chief acting as a deputy of the commission.

This requirement does not apply to restaurants, dining or dance halls.

There shall not be more than 12 seats in a row between aisles, nor more than 5 seats in a row which has an aisle on one side only.

No seat, bench or platform on which seats are placed shall be more than 22 inches in height of riser. No such seat bench shall be nearer the ceiling than 8 feet.

SECTION 8. AISLES AND PASSAGEWAYS.

Order 5514. Width of Aisles. Aisles having seats on both sides shall not be less than 2 feet 10 inches wide at the beginning and shall increase in width toward the exits at the rate of ¼ inch per foot of run; or the aisle may have a uniform width not less than the average width of the foregoing calculation; but no wall aisle shall be less than 3 feet wide and no other straight aisle shall be less than 3 feet 6 inches wide.

Where main aisles are longer than 40 feet, there shall be a cross aisle leading to each required side exit. Cross aisles shall not be less than 4 feet wide.

Order 5515. Passageways and Foyers. Passageways and foyers shall be of width required under order 5512, and in no case less than 5 feet wide, and shall be so designed and apportioned as to prevent congestion and confusion. Passageways and foyers which serve as means of egress (whether usual or emergency) shall be at least equal in combined width to the required width of the stairways, passageways or doors leading to them.

Order 5516. Inclines and aisled steps. To overcome any difference in level between courts, corridors, lobbies or passageways on the ground floor, inclines shall be employed. Inclines shall not exceed one foot of rise to five feet of run.

Steps in balcony aisles shall extend the full width of the aisle.

Order 5517. Obstruction. All aisles and passageways shall be kept free from camp stools, chairs and other obstructions, and no person except an employe shall be allowed to stand in or occupy any of the aisles, foyers or passageways during any performance or public gathering.

SECTION 9. ELEVATORS.

Order 5518. All elevators shall be enclosed with standard fireproof enclosures. (See elevator code issued by the Industrial Commission).

SECTION 10. STAGE.

Order 5519. Where required. The requirements of this section shall apply to all theater stages, except that in a motion picture theater an open platform not more than 8 feet in depth will be permitted in front of the motion picture screen, provided such screen is a stationary fireproof or semi-fireproof wall or partition, and the space behind such screen (if any) is entirely separated from the platform and auditorium by such partitions, and the platform has no curtain or scenery.

In a private assembly hall having a stage or platform which is more than six feet wider or higher than the proscenium opening, or which is equipped with movable scenery, such stage shall be protected as required by this section. (See order 5501.)

Order 5520. Proscenium Wall. The proscenium wall shall completely separate the stage from the auditorium, and shall be of brick, monolithic concrete, or other approved material, with all steelwork fireproofed, except as follows:

> In a private assembly hall, a fireproof partition (order 5109) may be used.
>
> In any theater or hall which accommodates not more than 400 persons, a semi-fireproof partition (order 5112) may be used.

The proscenium wall shall extend from the basement floor to the roof, except in fireproof buildings. It shall contain not more than two openings of not more than 21 square feet each (excluding the proscenium opening). Such opening shall be provided with standard fire doors, or (where a semi-fireproof partition is permitted) with wood doors lined with metal on the stage side.

Order 5521. Fireproof Curtain. The proscenium opening shall be provided with a rigid fireproof curtain or a curtain of asbestos conforming to the following specifications, or of equivalent approved construction. Detailed plans and specifications for such curtains and their operating mechanism shall be submitted to the Industrial Commission for approval before installation.

Asbestos curtains shall be substantially woven of asbestos fiber not less than 95 per cent pure and shall weigh not less than 2½ pounds per square yard. All seams shall be lapped not less than one inch and sewed in two rows with not less than 1-16 inch pure asbestos twine. At the top and bottom of the curtain a 1½ inch (or larger) pipe shall be placed and shall be securely fastened in and covered by the curtain. The curtain shall overlap the proscenium wall not less than 12 inches at each side and at the top, and shall be guided at each side by metallic loops or rings sliding on a steel cable. No combustible paint shall be used.

For curtains of any type, the connections between curtain and wall shall be made as nearly smoke-proof as possible. Provision shall be made to prevent the curtain from leaving or binding on the guides under any conditions. No part of a curtain or any of the curtain guides shall be supported by, or fastened to any combustible material.

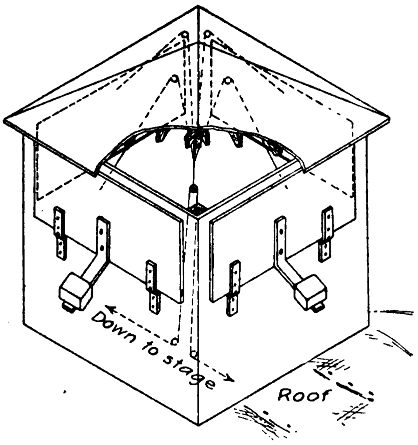
The hoisting apparatus for the curtain shall be designed with a factor of safety of 8 or more.

Besides the regular operating mechanism there shall be an emergency device which will allow the curtain to drop by gravity. The device shall be so arranged that it can be easily operated by hand from each side of the stage from the fly galleries, and also that its operation will be controlled by fusible links placed on each side of the stage, and when thus operated it shall descend at its normal rate of speed.

The curtain and its operating mechanism shall be so designed and constructed at all points, whether specifically mentioned or not, as to form an efficient and reliable barrier against fire and smoke, according to the best practice.

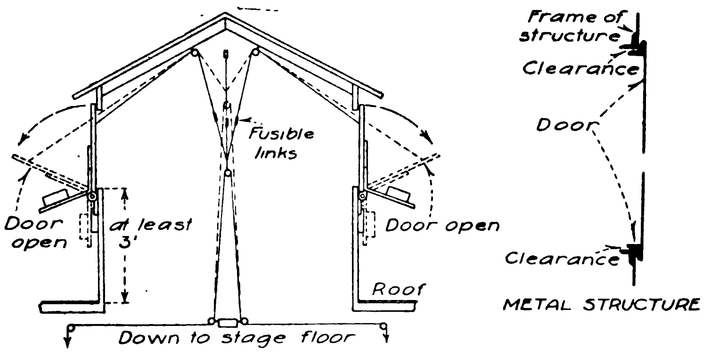
Note. It is recommended that this curtain be raised at the commencement and lowered at the close of each performance.
Rigid steel curtains, insulated with asbestos, are recommended as giving the best protection, especially in large theaters.

Order 5522. Automatic Ventilator. The stage shall be provided with one or more automatic ventilators placed near the center and above the highest part of the stage, with the bottom of the opening at least 3 feet above the



Total area of ventilator openings not less than area of shaft
Doors held closed by cords (shown dotted)
Fusible links release doors in case of fire
This structure may be made of wood, or of corrugated iron on metal frame (see below)
If door is made of wood, it must close against the frame, not into it, so as to prevent binding

VIEW OF WOODEN VENTILATOR



METAL STRUCTURE

SECTION OF WOODEN VENTILATOR

AUTOMATIC STAGE VENTILATOR

roof, and having a combined area equal to at least 8 per cent of the area of the stage floor. Vertical louvre openings shall be not less than twice the sectional area of the shaft. The ventilator shall be designed and constructed so as to open by gravity, and so as to effectively overcome the effects of neglect, rust, dirt, frost, snow, heat, twisting, or warping of the frame work. The louvres, or dampers in the openings shall be held closed by cotton or hemp cords running to the stage floor close to each stage door. Fusible links shall be inserted in each cord near the ventilator.

Order 5523. Stage Vestibules. All entrances to the stage shall be vestibuled in such manner as to protect the curtain, scenery, and auditorium from drafts of air.

Order 5524. Footlight Trough. The footlight trough shall be made of incombustible material.

Order 5525. Fireproof Paint. All stage scenery, curtains, and decorations made of combustible material, and all woodwork in or about the stage, shall be painted or saturated with some incombustible material or otherwise rendered safe against fire.

SECTION 11. DRESSING ROOMS, PROPERTY ROOMS, ETC.

Order 5526. All dressing rooms, property rooms, and other storage or workrooms shall be built of incombustible material throughout and shall be separated from the stage by fireproof walls or partitions.

No dressing room nor employes' room shall be placed more than one story below the grade line and no dressing room shall be placed above or below the auditorium.

SECTION 12. BOILER AND FURNACE ROOMS.

Order 5527. Every boiler or furnace room, including breaching, shall be enclosed with standard fire walls and with fireproof ceiling and floor each designed to carry a live load of at least 150 pounds per square foot; except that in the case of a private assembly hall accommodating not more than 300 persons, the floors and walls of the boiler or furnace room shall be incombustible, but fire doors and fireproof ceiling will not be required.

See also orders 5210, 5223, and the following order.

Note. If possible the boiler or furnace room should not be located below the stage, auditorium, foyer, or exits.

HEATING AND VENTILATING.

For heating and ventilation in theaters, assembly halls, etc., see the Heating and Ventilation Code, issued by the Industrial Commission, which applies to all public buildings and places of employment.

SECTION 14. LIGHTS.

Order 5529. Oil and Gas. (See also order 5224.) No oil lamp shall be used in or about any stage containing scenery.

No gas lighting of any kind shall be used on any stage containing scenery, nor in any property room, storage room, scene dock, or fly gallery, except in localities where electricity is not available. Gas fire used for heating water, etc., shall be enclosed in iron jackets.

Note. For theaters where outside electric current is not available, a private electric plant is strongly recommended.

Order 5530. Exit lights: Theaters. Exit lights shall be provided over all exits (both usual and emergency) and in such other places as may be necessary to direct the audience, performers, and employes to a street or alley. Such exit lights shall be either:

(1) Electric lights. (See order 5225, and special requirements for theaters in Wisconsin State Electrical Code).

(2) Candles, or oil lamps using non-volatile oil and floating wick; such lights shall be properly shielded from drafts and from adjacent woodwork or other combustible material.

Note. If such candles or oil lights are used, the management must of course be particularly careful to see that the lights are properly maintained and lighted before every performance.

Every light over an exit (both usual and emergency) shall be provided with a red illuminated sign bearing the word "exit" or "out" in plain letters at least 5 inches high, or a similar sign shall be placed below a red light.

All public parts of the theater (except the auditorium), and all exit lights, shall remain lighted throughout every performance and until the audience has left the building.

Order 5531. Exit lights: Assembly Halls. Every assembly hall in which the auditorium is not kept lighted throughout every performance or entertainment, shall be lighted the same as required for theaters. (Order 5530.)

In all other assembly halls, all stairways, passageways, and exit doors shall be properly lighted and shall remain lighted throughout every performance or entertainment and until the audience has left the building. Emergency exit doors shall be marked with red lights as in order 5132.

SECTION 15. TOILET ROOMS.

Order 5532. Separate toilet rooms in connection with the auditorium shall be provided for males and females. One closet shall be installed for each 200 females or fraction, and one closet and one urinal for each 300 males or fraction, assuming the audience to be equally divided between males and females; except that in dance halls there shall be provided one water-closet for each 100 females or fraction, one urinal for each 150 males or fraction and one water-closet for each 300 males or fraction.

There shall be separate water-closets provided for males and females in connection with the stage of every theater which accommodates more than 500 persons, except theaters used for motion picture exhibitions only.

Note. In theaters where motion picture machines are run continuously for a period of more than two hours without at least ten minutes intermission for the motion picture machine operator for each two hour period, toilets should be provided in direct connection with the motion picture booth. The operator should always be where the machines are in plain view, with control so arranged, direct and remote, that the power may be cut off instantly in emergency.

Consult the Industrial Commission for alternate where toilets cannot be installed.

Separate drinking fountains shall be provided for the stage and auditorium, wherever water supply is available.

One washbowl shall be provided for every two closets or urinals, or fraction.

See orders 5250 to 5265, inclusive.

SECTION 16. FIRE PROTECTION.

Order 5533. Standpipes. For exterior standpipes see order 5130.

If proper water supply is available, one or more standard interior standpipes (order 5134) shall be provided on the stage of every theater and every private assembly hall which has a stage (see order 5519). Each hose shall be not more than 75 feet long, and where such hose will not reach all parts of the stage section (including dressing, property, storage and work rooms) additional hose connections and hose, or additional standpipes shall be provided.

Order 5534. Fire Extinguishers. Standard fire extinguishers (order 5135) shall be provided as follows:

All theaters, including motion picture theaters:

Two on stage (if more than 1,500 square feet of scenery is used).

One on stage or platform (if not more than 1,500 square feet of scenery is used).

One in motion picture booth, or in ticket office if there is no booth.

One in dressing room section.

Public assembly halls, and private assembly halls which have a stage:

One on or near stage or platform.

One in or near ticket office (if capacity of hall is more than 500 persons).

Extinguishers shall be properly exposed to view and always accessible.

Order 5535. Automatic Sprinklers. Every theater which accommodates more than 600 persons shall have approved automatic sprinklers (order 5136) on the stage, under the stage, under the fly galleries, and under the stage roof, but not in the automatic ventilator.

Order 5536. Fire Alarm. Every theater which accommodates more than 1,000 persons shall have a fire alarm box on the stage.

SECTION 17. MIRRORS: FALSE OPENINGS.

Order 5537. No false opening giving the appearance of a door or window, where none exists, shall be placed in any part of a theater or assembly hall used by the public.

No mirror shall be placed in any part of the theater or assembly hall used by the general public except in the women's and men's retiring and toilet rooms.

SECTION 18. MOTION PICTURE MACHINES AND BOOTHS.

Order 5538. Definition. By the term "picture machine" as used in this code is meant any device used to project upon a surface moving pictures of any character which an audience is admitted to view.

Order 5539. Construction of Booth. Every picture machine using a nitro-cellulose or other inflammable film shall, before being operated, be installed in a booth constructed entirely of fire resisting material, such as brick, tile, concrete, two inch plaster on metal lath and metal frame or of sheet iron or asbestos sheathing as specified below; provided that approved types of portable motion picture machines may be used without a booth in factories and offices where employes are assembled for instructional purposes, or in assembly halls having a floor area of not more than 1,200 square feet, where not more than two exhibitions are given each month. In every case where a booth is not used a tight metal cabinet shall be provided and used for storing metal containers of films not in use.

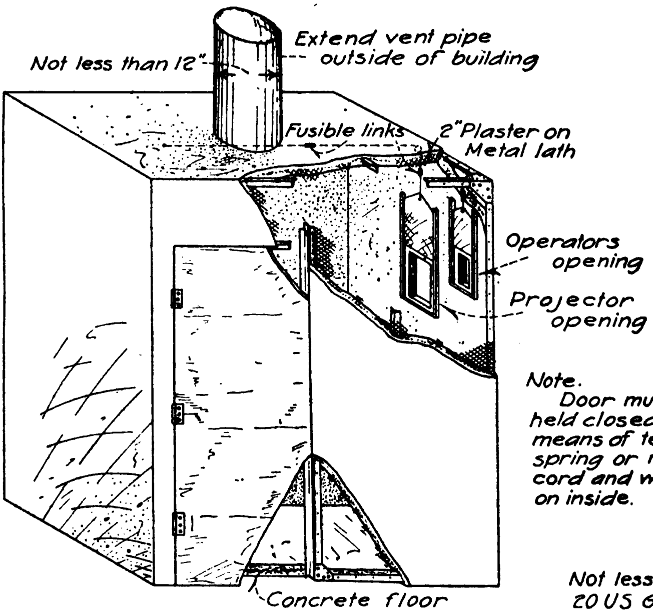
Note. No portable motion picture machine will be approved which does not have an incombustible housing (metal or abestos board or equivalent) and which does not provide for automatically insulating or cutting off the light and heat from the film and operating mechanism when the same is not in motion for projection purposes.

The exception permitting approved portable motion picture machines to be used without booths, under the restrictions given above, is made in favor of educational exhibitions. If such machines are used without observing these restrictions, the parties responsible will be held liable for the full penalty provided by statutes. Should experience demonstrate that the restrictions are frequently violated, the exception will be repealed.

The size of the booth (for one machine) shall be not less than 5 feet by 5 feet by 6 feet high.

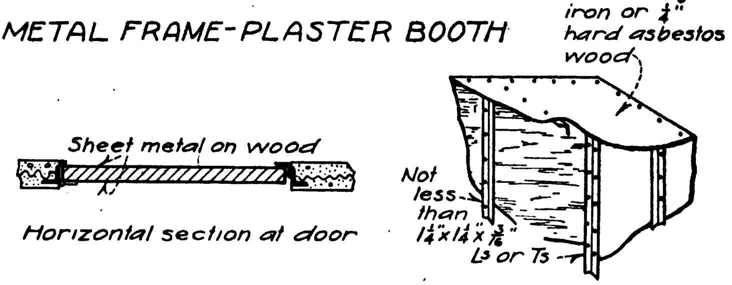
Note. Booth at least 6 by 6 by 7 feet is recommended.

Every booth made of sheet iron or asbestos sheathing shall have its frame constructed of not less than 1¼ x 1¼ by 3-16 inch steel angles or tees, properly braced to secure rigidity, securely riveted or bolted at joints. The sheathing shall be not less than No. 20 U. S. gauge sheet iron or ¼ inch hard asbestos lumber, securely riveted or bolted to the frame. No sheet metal booth shall be placed nearer to any combustible partition, wall, or ceiling, than 12 inches.



Note.
Door must be held closed by means of tension spring or metal cord and weight on inside.

METAL FRAME-PLASTER BOOTH


Not less than 20 US Gauge iron or ¼" hard asbestos wood
Sheet metal on wood
Not less than 1¼"x1¼"x3/16" Ls or Ts

Horizontal section at door

Typical Construction
METAL OR ASBESTOS

MOTION PICTURE BOOTHS

The floor shall be constructed of the same material as the sides and top, or of concrete. If the floor is made of sheet metal, it must be well riveted, or bolted to frame, and covered with a rubber or cork matting.

Order 5540. Door. The door shall be not larger than 2 by 5 feet, and shall either be of the same construction as the booth, or be at least ¾ inch thick and clad with metal not less than No. 28 U. S. gauge. The door shall swing outward, and close automatically, either by means of a spring on the outside or by a metal rope and weight.

Order 5541. Openings. The openings for the operator's view, or for the picture, shall not be larger than 12 inches square, except where approved in writing by the Industrial Commission, and shall be provided with a gravity door, of the same construction as specified for the booth, held open by fusible links placed in series, so arranged that one of the links is suspended directly over the film when it is in the slide of the apparatus; or the door shall be so arranged as to be closed, except when held open by pressure of the operator. Such door shall not be blocked or held open in any manner except as here described.

Order 5542. Ventilation. Every booth or room housing a motion picture machine shall be ventilated, and equipped to exhaust smoke and gas as specified in the Heating and Ventilation Code issued by the Industrial Commission.

EXTRACT FROM HEATING AND VENTILATION CODE

Order 5841. Motion Picture Booths.

1. Scope. This classification shall be understood to include all motion picture booths other than portable booths.

Note. See order 5539 of Building Code issued by the Industrial Commission.

2. Exhaust Ventilation Required. Exhaust ventilation shall be provided and maintained for every occupied area of this class, and such exhaust ventilation shall be independent of the auditorium ventilation system.

3. Minimum Air Movement. This air movement provided and maintained in occupied areas of this class

shall be not less than $1\frac{1}{2}$ cubic feet per minute per square foot or floor area in booth.

4. Minimum Size of Gravity Outlet Ducts. The effective area of gravity outlet ducts serving occupied areas of this class shall be not less than equivalent to 12 inches inside diameter, for each picture machine, unless adequate approved mechanical exhaust is provided; and all such ducts shall extend directly to the outside of building.

Note. Gravity outlet ducts from picture booths should be as nearly vertical as possible.

5. Mechanical Exhaust Systems Independent. Mechanical exhaust systems provided for occupied areas of this class shall be independent of all other ventilation systems in the building.

Order 5543. Electric Wiring. All electric wiring in the booth shall have an approved slow burning insulation. Each lamp connected with a picture machine shall be provided with a separate switch located within the booth.

Order 5544. Machine. Every machine shall be provided with feed and take-up reels in metal receiving boxes with riveted or flanged joints. A shutter shall be placed in front of the condenser, arranged so as to be closed except when held open by the operator, or by some other device that will insure the immediate dropping of the shutter when operation of the machine is stopped.

Order 5545. Films, etc. Magazines shall be used for receiving and delivering the films during the operation of the machine. Films not in the machine shall be kept in metal boxes with tight fitting covers when in the booth. No combustible substance of any sort shall be permitted in the booth, except the films used in operation. No smoking shall be permitted in any booth.

Note. It is suggested that, between pictures, a bulletin be thrown on the screen, stating the precautions taken to reduce danger of fire, and giving advice as the dangers which might arise from panic.

Order 5546. Temporary Booths. Every temporary booth shall be of approved design, conforming as far as possible to the requirements for permanent booths. Every booth used for more than three consecutive performances in one location will be considered a permanent booth.

Part VII

SCHOOL BUILDINGS, LIBRARIES AND MUSEUMS

The requirements of the following sections apply to buildings of this classification only.

For other general requirements, see Parts I to IV.

SECTION 1. CLASSIFICATION.

Order 5600. This classification includes all public, parochial, and private schools, colleges, academies, seminaries, libraries, museums and art galleries; including all buildings or parts of buildings used for the purpose of acquiring knowledge.

SECTION 2. HEIGHT AND CLASS OF CONSTRUCTION.

Order 5601. Maximum Height. No building which accommodates primary or grammar grades, or pupils averaging 14 years old or less, shall be more than three stories high, nor shall the topmost floor level be more than 35 feet above the grade at any outside door.

No building which is used as a high school, or which accommodates pupils averaging 18 years old or less, shall be more than four stories high, nor shall the topmost floor level be more than 48 feet above the grade at any outside door.

Order 5602. Class of Construction. Every building which is more than two stories high shall be of fireproof construction, except that in a three story building ordinary construction may be used above the third floor.

Buildings not more than two stories high shall be of ordinary, mill, or fireproof construction; except that a one-story building may be of frame construction if it is not within the fire limits of any city or village.

Order 5603. First Floor Fireproof. In all two-story buildings having more than four class, study, or recitation rooms of ordinary size on any floor, the first floor shall be of fireproof construction, except that floor panels and non-bearing partitions may be of protected construction. See Orders 5100-A and 5100-B. In all other two-story buildings the basement ceiling shall be of semi-fireproof construction or better.

Order 5604. Subdivisions and Fire Stops. Every building of this classification which is built in connection with a building of a lower grade of construction, shall be separated from such other building by standard fire walls, and all communicating openings shall be protected by standard fire doors. If such openings are used as a means of egress, they shall be kept normally open during the occupancy of the building.

In primary and grammar schools, the girls' and boys' portions of the basement shall be separated by a fireproof partition in which there shall be no opening except a door for the use of the janitor, kept normally closed.

Note. This serves the double purpose of fire protection and privacy.

See order 5201.

SECTION 3. EXPOSURE AND COURTS.

Order 5605. No wall containing windows which light a school or classroom shall be less than 30 feet away from any opposite building, structure or lot line, or opposite court wall; except that the distance from such opposite court wall may be reduced to not less than 20 feet provided light rays at an angle of 45 degrees are not thereby obstructed from entering the entire upper half of any such window.

SECTION 4. EXITS.

Order 5606. Number, Location, and Type. The number and location of exits shall be such that, in case any exit or passageway is blocked at any point, some other exit will still be accessible, through public passageways, from every classroom, and from every other room used by the public or by the occupants generally.

Exception. In a high school, college, library or museum building, one or two classrooms may be placed between the exit and the end of the corridor.

In a one-room building only one exit will be required. In a one-story two-room building only one exit will be required, provided all basement partitions are of incombustible material and the boiler room door is a standard fire door.

At least one-half of the required exits, in buildings of more than one story, shall be stairways (orders 5117–5119). The remaining exits shall be either stairways, or horizontal exits (order 5120); or fire escapes may be used as exits from floors which are not more than 40 feet above grade. All fire escapes on buildings which accommodate more than 100 persons above the first floor shall be "B" fire escapes.

In every building which accommodates more than 120 persons above the first story, there shall be at least two stairways. In buildings of more than two stories, the stairways shall be enclosed as in orders 5115–5116, unless the stairs and the corridors (including finish floors) are incombustible.

Note. In the case of stairways used by children, the rise should be less than the maximum permitted by order 5119. For primary grades, the rise should not be more than 7 inches.

Closets shall not be placed below non-fireproof stairways.

Handrails shall be provided on both sides of all exit stairs used by pupils.

Basement stairways which lead to the first floor shall be separated by standard fireproof partitions (order 5109) from all parts of the basement which are used for general storage or for the storage of inflammable material. At least one basement exit shall open directly to the outside.

Order 5607. Total Width. The total width of exits from any floor shall be not less than the following rates, based on the total number of persons accommodated on such floor and on the floors above:

Non-fireproof buildings, 40 inches per 100 persons.

Fireproof building, 30 inches per 100 persons. If the stairways are enclosed and an approved automatic sprinkler system is provided in the basement, such width may be reduced as in order 5404.

Standard fire escapes (orders 5121–5131) may be used for not to exceed one-third of the above total widths, subject to the limitations of the preceding order.

The capacity of a school building shall be established by the actual number of seats in rooms where such are used, or by the number of persons accommodated. The capacity of a library, museum, or art gallery shall be established by allowing to each person 100 square feet of the total floor area of the building, excluding stairways and elevators.

Order 5608. Exit Doors. Exit doors shall be as required in order 5132, except that they shall be not less than 2 feet 8 inches wide if used by children under 14 years. The aggregate width of exit doors shall be as required in order 5607. No single door or leaf of a double door shall be more than 4 feet wide. No revolving door shall be considered as a required exit from a building used by persons under 18 years of age.

Note. Single doors are better than double doors for school buildings.

Order 5609. Passageways. Corridors and passageways shall be so designed as to prevent congestion and confusion and shall be provided with windows and artificial light so as to be kept well lighted while building is occupied.

The minimum unobstructed width of corridors and passageways which are used by the public or by the occupants generally shall be determined the same as the width of stairways (order 5607) and shall in no case be less than 4 feet. Corridors and passageways serving as a means of egress shall be at least equal in combined width to the required width of the stairways or passageways leading to them.

SECTION 5. SCUTTLE.

Order 5610. Every building more than one story in height shall have a permanent means of access to the roof from the inside. The opening shall be not less than 20 x 30 inches and there shall be a permanent ladder or stairway leading thereto.

SECTION 6. ROOMS.

Order 5611. Floor Space and Height. The minimum floor space of school or classrooms shall be:

For primary grades, 12 square feet per person.
For grammar grades, 14 square feet per person.
All others, 16 square feet per person.

Note. These are minimum requirements. A more liberal allowance of floor space (16 to 20 square feet per person), is recommended.

All class, recitation and study rooms (not including manual training or domestic science rooms) shall be at least 12 feet high in the clear. All other rooms shall be at least 8 feet high in the clear.

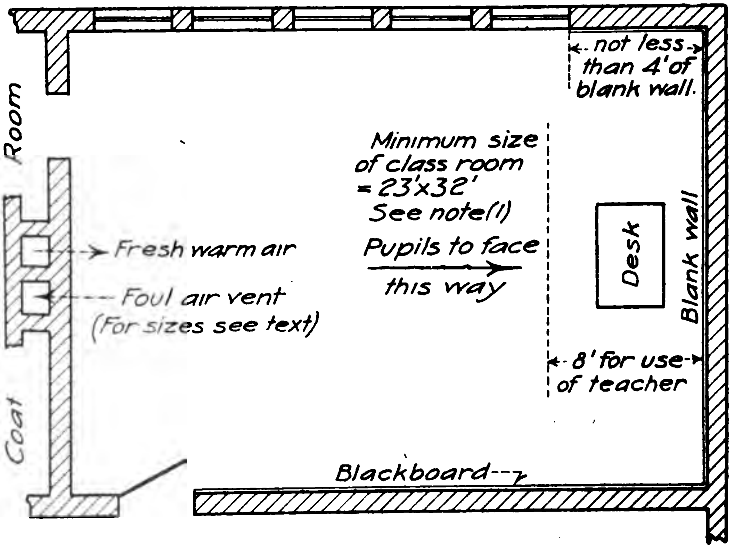
Note. The following are recommended by the Department of Public Instruction:

(1) Each classroom should be large enough to accommodate forty-five pupils and should be at least 23 feet wide by 32 feet long.

(2) Eight feet should be reserved at the end of the room for the use of the teacher. The corresponding wall space may conveniently be provided with a blackboard to contain programs, etc. The teachers' desk should always be placed at the end of the room and not on the long side. At the front of the room, eight feet of blank wall should be left between the front corner and the first window.

In classrooms lighted from the side only, the blank wall just mentioned may be reduced to four feet; the first window should then be provided with a shade for use on bright days. Windows should extend as close as possible to the rear corner. The ceiling height should be 12½ or 13 feet so as to give a glass ratio of at least 1:5½. This amount of glass area is especially necessary where electric current is not available.

(3) Blackboards should be from 24 inches (for primary grades) to 30 inches (for upper grades) above the floor, and from 36 to 48 inches high. Slate blackboards are best. A wide aisle should be provided next to all blackboards.


not less than 4' of blank wall.
Room
Minimum size of class room = 23'x32' See note(1)
Pupils to face this way
Desk
Blank wall
Fresh warm air
Foul air vent (For sizes see text)
8' for use of teacher
Coat
Blackboard

TYPICAL CLASS ROOM

Note on Windows. For window requirements see orders 2175 to 2180, inclusive, of the School Lighting Code issued by the Industrial Commission.

Order 5614. Basement Rooms. No class, recitation, or study room (not including manual training or domestic science rooms) shall have its floor more than 2 feet below the adjoining grade. Manual training and domestic science rooms, toilet rooms, and other rooms used by pupils (not including playrooms) shall have ceilings at least 4 feet above grade. The walls and floor of every basement room used by pupils or students, shall be waterproof and dampproof.

SECTION 7. ASSEMBLY HALLS.

Order 5615. A room which seats or accommodates 100 or more persons is governed by the requirements of Part VI, Theaters and Assembly Halls, except as follows:

The minimum width of any exit doorway used by children under 14 years of age may be 2 feet 8 inches (instead of 3 feet 4 inches); but in any case the aggregate width of such doorways shall be in accordance with Part VI.

Note. It is recommended that assembly halls in schools, especially when used by children under 14, be placed on the first floor so as to avoid the danger of panic.

SECTION 8. SEATS, DESKS AND AISLES.

Order 5616. Seats, chairs and desks (except those used by teachers) in class, recitation, or study rooms seating more than 50 persons shall be securely fastened to the floor; or not less than four seats (or two seats and two desks) shall be fastened together.

Class and schoolrooms shall have aisles along all walls.

In primary rooms, intermediate aisles shall be not less than 17 inches, and wall aisles not less than 2 feet 4 inches in width.

In grammar rooms, intermediate aisles shall be not less than 18 inches and wall aisles not less than 2 feet 6 inches in width.

In high school rooms and in all other class and schoolrooms, intermediate aisles shall be not less than 20 inches and wall aisles not less than 3 feet in width.

Assembly hall seats and aisles shall conform to the requirements for assembly halls (orders 5513–5517).

SECTION 9. BOILER AND FURNACE ROOM.

Order 5617. In buildings of more than one story all boiler or furnace rooms, fuel rooms and laundries shall be enclosed (together with breaching) with fireproof floor and ceiling and with incombustible walls at least 8 inches thick (or 5 inches thick if of reinforced concrete) with all openings protected by standard fire doors. Such boiler or furnace shall be separated as effectively as possible, either by distance or by partitions and doors, from all stairways leading to the first floor, and especially from stairways which lead continuously to the upper floors.

Note. Boilers and furnaces are strongly recommended to be placed in separate buildings. This will eliminate the most frequent cause of school fires.

SECTION 10. TOILET ROOMS.

Order 5618. School buildings shall have the following sanitary equipment:

> One water-closet for every 20 females or fraction except for grammar and primary grades, where there shall be one water-closet for every 15 females or fraction.
>
> One water-closet and one urinal for every 40 males or fraction, except for grammar and primary grades, where there shall be one water-closet and one urinal for every 30 males or fraction.
>
> A drinking fountain and sink shall be installed in each story and basement, for each 6,000 square feet of floor area, or fraction. Drinking fountains shall not be installed in toilet rooms.
>
> A proper number of washbowls shall be provided.

Note. Ordinarily there should be at least one washbowl for every two closets or urinals. Washbowls should be placed either in the toilet room or immediately outside.

See also orders 5250-5265, inclusive.

Where sewer system is not available see requirement of orders 5262 and 5263. Privies, where permitted, shall be placed at least 20 feet away from any other occupied building, and shall be constructed as specified in the Wisconsin Code for Rural School Privies issued by the State Board of Health.

For requirements governing toilets other than water flush toilets, consult the rules of the State Board of Health relating to the sanitary care of schools.

HEATING AND VENTILATION.

For heating and ventilation in schools, libraries, etc., see the Heating and Ventilation Code, issued by the Industrial Commission, which code applies to all public buildings and places of employment.

SECTION 12. LIGHTING.

Order 5620. Artificial Lighting. Each classroom of standard size (32 feet long by 23 feet wide) shall be equipped with at least six artificial lighting units symmetrically spaced.

Where electric service is available at least one circuit of 15 amperes capacity (see Wisconsin State Electrical Code) shall be supplied to each standard classroom.

See Orders 2181 to 2189, inclusive, of the School Lighting Code issued by the Industrial Commission.

SECTION 13. STANDPIPES AND FIRE EXTINGUISHERS.

Order 5621. For standard exterior standpipes see order 5130.

In every building which is more than one story high and which is not provided with interior standpipes, standard chemical fire extinguishers (order 5135) shall be provided in the proportion of one extinguisher to each 3,000 square feet of floor area or fraction in non-fireproof buildings, or one to each 8,000 square feet of floor area or fraction in fireproof buildings; but there shall be at least one fire extinguisher on each floor including basement. All fire extinguishers shall be prominently exposed to view and always accessible.

Note. Automatic sprinklers (order 5136) are recommended for all parts of the basement where combustible material is liable to be stored.

SECTION 14. FIRE ALARMS.

Order 5622. Every building two stories or more in height shall be provided with a proper alarm or gongs which can be operated from any story, including basement, and can be heard throughout the building. Such alarm system shall be tested at least once a week.

NOTE ON MOTION PICTURE STAGES AND BOOTHS.

For motion picture booths and stages in schools see order 5501.

Part VIII

APARTMENT HOUSES, HOTELS AND PLACES OF DETENTION

The following requirements apply to buildings of this classification only.

For other general requirements see Parts I to IV. For rooms which accommodate more than 100 persons, see Part VI, Theaters and Assembly Halls.

Note. This code in no way effects the validity of chapter 176 of the statutes, known as the Tenement House Law for cities of the first class (i. e., Milwaukee). On all points where the requirements of the Tenement House Law are more stringent than the requirements of this code, the Tenement House Law must be complied with for buildings in Milwaukee. All requirements of this code which are not covered in the Tenement House Law will apply in Milwaukee the same as elsewhere.

SECTION 1. CLASSIFICATION.

Order 5700. Apartment (Tenement) Houses. This classification includes every building or part of a building occupied as the residence of three or more families living independently, or occupied by two such families and also used for business purposes.

Order 5701. Hotels and Places of Detention. This classification includes all hotels, lodging and boarding houses, club-houses, dormitories, convents, hospitals, asylums, jails, and other places of detention, including every building or part of a building used for sleeping or lodging purposes by three or more persons not members of a family, provided that where the number of such persons is less than six, the following orders shall not apply: 5703 to 5716, inclusive, 5720, 5726 to 5729, inclusive.

Note. Where the following requirements refer to "families" or "apartments," the requirement applies to apartment houses; where they refer to "persons" or "rooms," the requirement applies to hotels and places of detention.

SECTION 2. HEIGHT AND CLASS OF CONSTRUCTION AND FIRE STOPS.

Order 5702. Fireproof Construction. Buildings of four or more stories shall be of fireproof construction, except that hotels and apartment houses not more than 4 stories in height may have floor panels and non-bearing partitions of protected construction. See Orders 5100-A and 5100-B.

All places of detention where persons are confined by locked doors or barred windows, shall be of fireproof construction.

Hospitals of three or more stories shall be of fireproof construction; except that hospitals not more than three stories in height may have floor panels and non-bearing partitions of protected construction. See orders 5100-A and 5100-B.

Order 5703. Ordinary Construction. All three story buildings of this classification shall be of fireproof, mill, or ordinary construction, except that a three story apartment house which accommodates only one family on each floor may be frame construction if not within the fire limits of any municipality.

Order 5704. First Floor Fireproof. In three story buildings, the first floor and all members supporting the same shall be of fireproof construction; except that in a three story building which accommodates not more than four families or 30 persons above the first story., the basement ceiling shall be either fireproof or semi-fireproof (order 5113); in such cases the spaces between floor joists, below or above stud partitions, shall be fire-stopped with incombustible material extending the full height of the joists and the full thickness of the partition.

Order 5705. First Floor Used for Business Purposes. In all buildings whose first story is used for a garage, the first story ceiling shall be of fireproof construction; except that in buildings not more than three stories in height floor panels may be of protected construction. See Order 5100-A.

In a building more than two stories high whose first story is used for business purposes, the ceiling shall be either fire-proof or semi-fireproof (order 5113).

Order 5706. Room Containing Inflammable Material. Every room or apartment which is used for a carpenter or paint shop, or other equally inflammable material, shall be enclosed with fireproof ceiling and floor and with incombustible walls at least 8 inches thick (or 5 inches thick if of reinforced concrete) with all openings protected by standard fire doors.

Order 5707. Corridor and Dividing Partitions. In every building which is more than two stories high and which has more than one apartment or eight rooms on any floor, the public passageways shall be enclosed with fireproof or semi-fireproof partitions (orders 5109, 5112); if there is more than one apartment on any floor, such apartments shall be separated by such partitions; if there are more than eight rooms on any floor, they shall be divided by such partitions into groups of not more than eight rooms each.

Note. Doors in semi-fireproof corridor partitions need not be self-closing, nor of thickness required by order 5112, but should be properly constructed, fitted and hung.

SECTION 3. YARDS.

Order 5708. Behind every apartment house, the rear of which does not abut on an alley or street, there shall be a yard across the entire width of the lot, open and unobstructed from the ground to the sky. The width of the yard behind a two story building shall be either:

(1) At least 5 feet of unobstructed width; or

(2) At least 10 feet from the rear lot line to the building line, of which at least 3 feet shall be unobstructed, and the remainder may be occupied by an open (or screened) porch.

For apartment houses of more than two stories, the unobstructed width of the entire yard shall be increased one foot for each additional story, except in the case of corner lots.

No apartment house shall be placed behind any other building. Every apartment house shall abut on a street and the front wall shall be at least 25 feet from the center of the street.

SECTION 4. COURTS AND SHAFTS.

Order 5709. All courts and shafts for light, air, or dumb-waiter, shall be completely enclosed with fireproof or semi-fireproof partitions or walls (orders 5109, 5112) except as provided below.

In the case of semi-fireproof partition enclosing a court or shaft in a building of not more than three stories, the fire-resisting material will only be required on the side of the partition toward the court or shaft.

In a fireproof building, an open well piercing the second (mezzanine) floor only, will be permitted. The mezzanine floor will be considered as a full story.

Walls of outer courts and lot line courts shall be constructed the same as required for outside walls.

For elevator shafts see elevator code.

For minimum size, etc., of courts and shafts see orders 5203-5206, inclusive.

SECTION 5. EXITS.

Order 5710. Number, Location, Type. There shall be at least two exits accessible from each room or apartment, and such exits shall be at least 30 feet apart, measuring along the shortest line but not piercing any fireproof partition or wall. The number and location of exits shall be such that in case any exit or passageway is blocked at any point, some other exit will still be accessible, through public passageways, from every room or apartment; also that the entrance to each room or apartment will be not more than 50 feet distant from an exit (measuring along public passageways) if in a non-fireproof building, or 75 feet in a fireproof building.

Note. This evidently requires at least two exits from every building and also requires an exit at the end of every corridor.

Exceptions. In a fireproof building, or in a two-story nonfireproof building, not more than four double rooms, or any arrangement of rooms not exceeding 800 square feet in area, may be placed between an exit and the end of the corridor.

At least one-half of the required exits, in buildings of more than one story, shall be stairways (orders 5117-5119).

The remaining exits shall be either stairways, or horizontal exits (order 5120) ; or fire escapes may be used as exits from floors which are not more than 40 feet above grade. Every building which accommodates more than one family or eight persons above the second story shall have at least two stairways.

Fire escapes for hospitals and asylums shall be "B" fire escapes.

Order 5711. Stairways. In three-story buildings, all stairways shall be enclosed as in order 5115 or 5116, unless the building is either fireproof or sprinklered; except that the doors may be omitted in one stairway enclosure. In three-story buildings accommodating more than two families or 15 persons above the first story, all basement stairways shall be enclosed with fireproof enclosures.

In buildings of more than three stories, all stairways shall be so enclosed, except that in fireproof buildings one stairway may be unenclosed from the first to the third (or second) floor, provided such stairway is enclosed in the third (or second) story and does not lead to the basement.

In all buildings of more than two stories, in which the first story is used for business purposes, at least one stairway shall be enclosed in the first story with an unpierced fireproof enclosure (order 5109) and such stairway shall not connect with the basement.

In apartment houses, outside stairways may be counted as exits if covered by a roof. If more than one family is accommodated above the second story, the stringers and other supporting members of outside stairs and platforms shall be of incombustible material; the treads and flooring, if of wood, shall be at least 1⅝ inches thick. If more than two families are accommodated above the second story, the adjoining doors and windows shall be protected as in order 5121.

Note. Outside rear stairways have been found satisfactory on many apartment houses. They serve the purpose of a rear stairway and fire escape combined.

In high buildings one or more exterior enclosed stairways (order 5115) should be provided.

Order 5712. Aggregate Width. The aggregate width of exits shall be as provided in order 5404.

Note. Stairways and doors of minimum width will be found sufficient to comply with this order except in large hotels.

Order 5713. Exit Doors. Exit doors shall be as specified in order 5132; except that a door which is used by not more than six families or 40 persons, shall be not less than 3 feet wide and shall not be required to open outward.

Order 5714. Passageways. Every public passageway leading from an exit shall be at least as wide as the required width of such exit. Every public passageway leading to an exit shall be at least 3 feet wide. The required width shall be kept clear and unobstructed at all times.

SECTION 6. LIGHTS.

Order 5715. In every building which accommodates more than 4 families or 30 persons, and in every building which accommodates transients, the public passageways and stairways and exit doors shall be illuminated from one hour after sunset to one hour before sunrise. This illumination shall include lights at all intersections of passageways, at all exits, and at the head and foot of every stairway. The lights at emergency exit doors shall be red lights and shall be accompanied by a sign bearing the words "exit" or "out," in plain letters.

See also orders 5224-5225, and 5132.

SECTION 7. SCUTTLE.

Order 5716. Every building more than one story in height which accommodates more than 4 families or 30 persons shall have a permanent means of access to the roof from the inside. The opening shall be not less than 20 x 30 inches and there shall be a permanent ladder or stairway leading thereto.

NOTE ON ELEVATORS AND ELEVATOR ENCLOSURES.

See elevator code issued by the Industrial Commission.

SECTION 8. ROOMS AND WINDOWS.

Order 5717. Size of Rooms. Every sleeping room shall be of sufficient size to afford at least 400 cubic feet of air space for each occupant over twelve years of age, and 200 cubic feet for each occupant under twelve years. No greater number of occupants than the number thus established, shall be permitted in any such room.

Order 5718. Basement Rooms. Every basement, living or sleeping room shall be at least 8 feet high from floor to ceiling. The ceiling shall be at least 4 feet above the outside grade. The walls and floor shall be damp proof and waterproof.

No rooms wherein persons are forcibly confined shall be located in a basement.

Order 5719. Windows. The outside windows in every sleeping or living room shall have a total area of at least one-tenth of the floor area of the room, but not less than 12 square feet. The top of at least one such window shall be not less than 6½ feet above the floor, and the upper half of it shall be made so as to open the full width.

See also orders 5203-5206, inclusive.

SECTION 9. LAUNDRIES, BOILER AND FURNACE ROOMS.

Order 5720. All boiler and furnace rooms, including breaching, and all laundries and drying rooms, in all buildings accommodating transients and in hospitals, asylums and other places of detention, shall be enclosed with standard fireproof enclosures and fireproof floor and ceiling.

See also orders 5210-5223, inclusive.

HEATING AND VENTILATION.

For heating and ventilation in apartment houses, hotels, etc., see the Heating and Ventilation Code issued by the Industrial Commission, which code applies to all public buildings and places of employment.

SECTION 11. TOILET ROOMS.

Order 5722. Every apartment shall have a water-closet in a bathroom or separate compartment; except that where there are apartments consisting of but one or two rooms there shall be at least one water-closet for every two such apartments if shown on approved plans.

All other buildings of this classification shall have at least one water-closet for every 15 rooms or fraction thereof.

See also orders 5250-5265, and 5723.

Note. Rooms with private water-closets shall not be considered in counting either the number of rooms or the number of water-closets.

Water-closets and urinals and pipes connecting therewith shall be protected against frost as provided in order 5261. In every apartment house where any such closet or urinal is not located, within a private apartment, such protection shall be furnished by the owner.

SECTION 12. WATER SUPPLY.

Order 5723. In every building of this classification where city water supply is available or can be made available, there shall be at least one proper sink or washbowl with running water. In apartment houses there shall be such a sink or washbowl in each apartment.

SECTION 13. REPAIRS.

Order 5724. Every building of this classification, and all the parts thereof, shall be kept in good repair and the roof shall be kept so as not to leak and all rainwater shall be so drained and conveyed therefrom as not to cause dampness in the walls or ceilings.

SECTION 14. CLEANLINESS.

Order 5725. Every building shall be kept clean and shall also be kept free from any accumulation of dirt, filth, rubbish, garbage, or other matter in or on the same or in the yards, courts, passages, areas or alleys connected with or belonging to the same.

Note. It is the duty of the owner as well as the tenant, to see that this order is complied with.

SECTION 15. STANDPIPES AND FIRE EXTINGUISHERS.

Order 5726. For exterior standpipes see order 5130.

Standard interior standpipes (order 5134) shall be provided in every building which is more than two stories high and accommodates 20 or more transients, and in all hospitals, asylums and other places of detention. Not more than 75 feet of hose (order 5134) shall be attached to each standpipe at each floor level. The number and location of interior standpipes shall be such that the hose will reach at least two feet inside of each room.

In the above buildings where adequate water supply is not available, and in buildings accommodating less than 20 transients where interior standpipes are not provided, a standard fire extinguisher (order 5135) shall be placed on each floor at the head of each stairway and at each elevator or group of elevators.

SECTION 16. FIRE ALARM.

Order 5727. In every building which accommodates 20 or more transients, there shall be a proper alarm or gongs which can be operated from any story and can be heard throughout the building. Every such alarm system shall be tested at least once every week.

SECTION 17. DIRECTIONS FOR ESCAPE.

Order 5728. In every room liable to be used by transients a notice shall be conspicuously posted giving complete and plain directions for reaching at least two exits.

INDEX

BY ORDER NUMBERS

- Aisles, Apartment houses, hotels, etc., 5714.
  - Factories, office buildings, etc., 5407, 5410.
  - General requirement, 5133.
  - Schools, libraries, museums, etc., 5609, 5615.
  - Theaters, assembly halls, etc., 5514-5517.
- Alley definition of, 5107
- Alterations in buildings, 5001.
- Appeal (page 9).
- Apartment houses, hotels, places of detention, etc.,
  - Basement rooms, 5718.
  - Boiler and furnace rooms, fire prevention, 5720, 5210-5217.
  - Business on first floor, required construction, 5705.
  - Chimneys, 5218-5223.
  - Cleanliness, 5725.
  - Construction, type of, 5702.
  - Corridor and dividing partitions, 5707.
  - Courtts and shafts, 5709, 5204–5206.
  - Design, 5200, 5300-5320.
  - Directions for escape, 5728.
  - Elevators, (See Elevator Code).
  - Exit doors, 5713, 5132.
  - Exits, number, location and type, 5710, 5133.
  - Exits total width required, 5712.
  - Fire alarm, 5727.
  - Fire escapes, 5710, 5121-5131.
  - Fire extinguishers, 5726, 5135.
  - Fireproof construction, where required, 5702.
  - First floor fireproof, 5704.
  - Garage on first floor, required construction, 5705.
  - Height, limit of, 5702.
  - Inflammable material. isolation of, 5706.
  - Lighting, 5715, 5224, 5225.
  - Ordinary construction, where required, 5703.
  - Passageways, 5714.
  - Plans, approved of, 5008.
  - Repairs, 5724.
  - Scuttle, 5716.
  - Size of rooms, 5717.
  - Size of windows, etc., 5719, 5203.
  - Stairways, 5711, 5115-5119.
  - Standpipes, 5726, 5130, 5134.
  - Toilet rooms, 5722, 5250-5265.
  - Ventilation, 5721.
  - Water supply, 5723.
  - Yards, 5708.
- Approved, defined (page—).
- Asbestos curtain, 5521.
- Assembly halls, (See Theaters).
- Asylums (See Apartment houses).
- Automatic fire door, 5110.
- Automatic sprinklers,
  - Factories, office buildings, etc., 5412.
  - General requirement, 5136.
  - Theaters, assembly halls, etc., 5535.

- Basement, definition, 5105.
- Basement rooms,
  - Apartment houses, hotels, etc., 5718.
  - Hospitals, asylums, convents, etc., 5718.
  - Jails, etc., 5718.
- Beams, wood, framing, 5320.
- Bearing walls, brick, required construction, 5304.
- Bearing walls, wood, 5318.
- Boiler room, fire prevention,
  - Apartment houses, hotels, etc., 5720.
  - General requirement, all buildings, 5210.
  - Hospitals, convents, asylums, jails, etc., 5720.
  - Protection, floor, wall and ceiling, 5211-5212.
  - Schools, libraries, etc., 5617.
  - Theaters, assembly halls, etc., 5527.

  - Chimneys, construction of, etc., 5218-5223.
  - Construction, class, height, etc., 5201, 5202.
  - Design, 5300-5320.
  - Dressing rooms, 2218.
  - Drinking water, 2217.
  - Electrical work, 5225.
  - Elevator (See Elevator Code).
  - Enclosed stairways, where required, 5403.
  - Exit doors, 5406, 5132.
  - Exit door signs, 5406.
  - Exit lights, 5406, 5132.
  - Exits, number and location, 5401, 5133.
  - Exits, type of, 5402.
  - Fire alarm, 5413.
  - Exits, required total width, 5404.
  - Fire escapes, 5121-5131.
  - Fire escapes, where required, 5403.
  - Fire extinguishers, 5411, 5135.
  - Floor opening, 5409.
  - Furnace pipes, 5215-5216.
  - Lavatories, 2214, 2215, (page —).
  - Lighting, 5410, 5224.
  - Load allowed on floors, notices, 5414, 5415.
  - Passageways, requirements, 5407.
  - Plans, approval of, 5008.
  - Scuttle, 5408.
  - Smoke pipes, 5213.
  - Stairways, 5115-5119.
  - Stairways, enclosure, 5403.
  - Standpipes, 5411, 5130, 5134.
  - Steam pipes, 5214, 5130, 5134.
  - Toilet rooms, 2203 (page 80), 5250–5265.
  - Trap doors, 5409.
  - Window cleaners safety device, 56 (page 61).

- Fire escapes,
  - Apartment houses, hotels, etc., 5710, 5121-5131.
  - Balanced stairway, 5127.
  - Brackets, 5125.
  - Convents, hospitals, asylums, jails, etc., requirement for, 5710, 5121-5131.
  - Exits to, 5122.
  - Factories, office buildings, etc., 5402, 5403, 5121–5131.
  - Frame bars, 5124.
  - Hand railings, 5128.
  - Ladder to roof, 5129.
  - Location, 5121.
  - Material, 5123.
  - Platforms, 5124.
  - Schools, libraries, etc., 5606, 5607, 5121-5131.
  - Stairways, 5126.
  - Standpipe, 5130.
  - Strength, 5123.
  - Theaters, assembly halls, etc., 5510, 5121-5131.
  - Treads, 5126.
  - Types other than stairway, 5131.
- Fire extinguishers,
  - Apartment houses, hotels, etc., 5726.
  - Factories, office buildings, etc., 5411.
  - General requirements, 5135.
  - Hospitals, convents, asylums, jails, etc., 5726.
  - Schools, libraries, etc., 5621.
  - Theaters, assembly halls, etc., 5534.
- Fireproof construction, 5100.
- Fire stops in partitions, 5112, 5318, 5704.
- First floor, defined, 5105.
- Floor area, maximum permitted, 5202.
- Floor loads, 5300.
- Foundation loading, 5302.
- Floor openings in factories, 5409.
- Frame buildings, 5103.
- Furnace rooms (See Boilers, etc.).
- Furnaces, 5210-5219.
- Furring, wood, 5319.

- Garages, requirements for,
  - Apartments over, 5705.
  - Assembly hall over, 5505.
  - Chimney construction, 5218-5219.
  - Class of construction, 5240.
  - Electric wiring, 5225.
  - Elevators (See Elevator Code).

Boilers, furnaces, stoves, etc., 5210-5212.
Booths, motion picture machines, 5538-5546.
Bond, masonry walls, 5304, 5307, 5308.
Brick walls, 5303-5312.
Building blocks, hollow, requirement for, 5830.
Building, height, 5104.
Buildings covered by code, 5000-5005.
Buildings not covered by code, 5006.

Capacity of buildings,
    Factories, office buildings, etc., 5405.
    Notice posted, 5415.
    Schools, libraries, museums, etc., 5607.
    Theaters, assembly halls, etc., 5506.
Chimneys, construction of etc.
    Design, 5221, 5223.
    Flue lining, 5219.
    Large chimneys, 5220.
    Masonry, 5218-5219.
    Metallic chimneys, 5222.
    Protection of, 5218.
City regulations, 5007.
Club houses (See Apartment houses).
Combustible ceiling, 5114.
Combustible partition, 5114.
Concrete blocks, 5303, 5332.
Concrete materials, 5314.
Concrete, plain, walls, 5315.
Concrete reinforced, allowable stresses in, 5313.
Concrete reinforced, minimum requirement, 5313.
Construction, class of, restrictions,
    Apartment houses, hotels, etc., 5702-5707, 5201.
    Assembly halls, 5503, 5201.
    General requirements, all buildings, 5201.
    Hospitals, convents, asylums, jails, etc., 5702–5707, 5201.
    Schools, 5602, 5603, 5201.
    Theaters, 5502, 5201.
    Toilet rooms, 5257, 5258.
Convents, (See Apartment houses).
Courts,
    Apartment houses, hotels, etc., 5709.
    Definition of, 5107, 5204.
    Hospitals, convents, asylums, jails, etc., 5709.
    Schools, 5605.
    Size of, 5205.
    Theaters, assembly halls, etc., 5504, 5204-5206.
    Ventilation of, 5206.
Curtain wallsfi, construction, 5305.

Dance halls, (See Assembly halls).
Design and supervision of buildings, requirements for, 5200.
Dry cleaning establishments, requirements for, 5235.
Electric wiring, 5225.
Elevators, (See Elevator Code).
    Theaters and assembly halls, 5518.
Exhibition buildings (See Factories).
Existing buildings, 5005.
Exit doors,
    Apartment houses, hotels, etc., 5713, 5132.
    Fire escapes, 5122.
    Hospitals, convents, asylums, jails, etc., 5713, 5132.
    Schools, libraries, etc., 5608, 5132.
    Standard 5132.
    Theaters, assembly halls, etc., 5511, 5132.
Exit lights,
    Apartment houses, hotels, etc., 5715.
    Factories, office buildings, etc., 5410.
    General requirement, all buildings, 5132.
    Hospitals, convents, asylums, jails, etc., 5715.
    Schools, libraries, museums, etc., 5609.
    Theaters, assembly halls, etc., 5530-5531.
Exits,
    Apartment houses, hotels, etc., 5710–5715, 5123.
    Factory, office buildings, etc., 5401-5404, 5123.
    General requirement, 5123.
    Hospitals, convents, asylums, jails, etc., 5710-5715, 5123.
    Schools, libraries, etc., 5606-5608, 5123.
    Theaters, assembly halls, etc., 5507–5512, 5123.
Factories, office and mercantile buildings,
    Automatic sprinklers, 5412, 5136.
    Boilers, protection of, 5210-5212.
    Capacity, 5405.

- Heating system, fire prevention, 5210-5217.
- Hotel over, 5705. (See order 5701).
- Roof construction, 5102, 5106, 5300.
- Toilet rooms, 5250-5265
- Wall construction, 5304, 5308, 5309,

Gas lights, 5224 (See also Lighting).

Halls, (See Assembly halls).
Heating apparatus, protection of, 5210-5212.
Height of buildings, limit of,
- General requrement, 5201.
- Schools, 5601, 5201.
- Theaters, assembly halls, etc., 5502, 5201.

Hollow masonry walls, 5308.
Hospitals (See Apartment houses).
Hot air flues.
- General requirement, 5217.
- Schools, 5619, 5217.

Hot air pipes, protection of, 5215.
Hotels, (See Apartment houses).
Incombustible,
- Roof covering, 5106.
- Material, 5100.

Jails, (See Apartment houses).
Laundries, requirements for,
- Apartment houses, hotels, etc., 5720.
- Hospitals, convents, asylums, jails, etc., 5720.
- Schools, 5617.

Laundry drying rooms,
- Apartment houses, hotels, etc., 5720.
- General requirements, all buildings, 5230.
- Hospitals, convents, asylums, jails, etc., 5720.

Libraries (See Schools).
Lighting, eleericity,
- Apartment houses, hotels etc., 5715.
- Assembly halls, 5531.
- Factories, office buildings, etc., 5410.
- Garages, 5225.
- General requirement, all buildings, 5225.
- Hospitals, convents, asylums, jails, etc., 5715.
- Schools, libraries, etc., 5609, 5620.
- Theaters, 5530.

Lighting, oil and gas.
- Apartment houses, hotels, etc., 5715.
- Assembly halls, 5529, 5531.
- Factories, office buildings, etc., 5410.
- General Requirement, all buildings, 5224.
- Hospitals, convents, asylums, jails etc., 5715.
- Schools, libraries, etc., 5609, 5620.
- Theaters, 5529, 5530.

Lodge hall (See Assembly halls).
Masonry, allowable stresses, 5308.
Metal lumber, 5100, 5100-A, 5100-B.
Mill construction, 5101.
Motion picture machines and booths, 5538-5546.
Museums (See Schools).
Office buildings (See Factories).
Oil lights, 5224 (See also lighting).
Old walls, 5312.
Ordinary construction, 5102.
Panic hardware, on exit doors, 5132.
Parapet walls, construction of, 5310.
Pile foundation, 5302.
Plans approval of, 5008.
Registers, protection of, 5216.
Repairs to buiding, 5005.
Roof loads, 5300.
Schools, libraries and museums.
- Assembly halls, 5615.
- Basement exits, 5606.
- Basement rooms, 5614.
- Basement stairways, 5606.
- Boiler and furnace room, fire prevention, 5617, 5210-5219.
- Capacity, 5607.
- Closets below stairways, 5606.
- Construction, class of, 5602.
- Design, 5200, 5300-5320.
- Exit doors, 5608, 5132.
- Exits, number, location and type, 5606, 5133.
- Exits, total width required, 5607.
- Exposure and courts, 5605.
- Fire alarms, 5622.

  - Fire escapes, 5606, 5121–5131.
  - Fire extinguishers, 5621, 5135.
  - First floor required fireproof, 5603.
  - Handrails on stairs, 5606.
  - Heating, 5619.
  - Height, maximum, 5601.
  - Height of rooms, 5611.
  - Lighting, 5620, 5224, 5225.
  - Motion picture machine, booths, 5538–5546.
  - Passageways, 5609.
  - Plans, approval of, 5008.
  - Scuttle, 5610.
  - Seats, desks and aisles, 5615.
  - Size of rooms, 5611.
  - Stairways, 5606, 5115-5119.
  - Standpipes, 5621, 5130, 5134.
  - Sub-division for fire protection, 5604.
  - Toilet rooms, 5618, 5250-5265.
  - Ventilation, 5619.
- Scuttle.
  - Apartment houses, hotels, etc., 5716.
  - Factories, office buildings, etc., 5408.
  - Schools, libraries museums, etc., 5610.
- Seats.
  - Schools, etc., 5615.
  - Theaters, assembly halls, etc., 5513.
- Semi-fireproof.
  - Partitions, 5112, 5102.
  - Ceiling, 5113.
- Service closets, 5266.
- Smoke pipes, protection of, 5213.
  - Smokestacks, 5218-5223.
  - Sprinklers, (See Automatic sprinklers).
- Stairways.
  - Apartment houses, hotels, etc., 5710–5712, 5115–5119.
  - Exterior enclosed, 5115.
  - Factories, office buildings, stores, 5402–5404, 5115–5119.
  - Fire escape, 5121-5131.
  - General recommendation (page 22).
  - Handrails general requirement, 5118.
  - Hospitals, convents, asylums, jails, etc., 5710–5712, 5115, 5119.
  - Interior enclosed, 5116.
  - Risers, 5119.
  - Schools, libraries, etc., 5606, 5607, 5115–5119.
  - Smoke proof tower, 5115.
  - Theaters, assembly halls, etc., 5507-5510, 5115-5119.
  - Treads, 5119.
  - Width, general requirement, 5117.
  - Winders, 5119.
- Standard fire door, 5110.
- Standard fireproof enclosure, 5109.
- Standard fireproof partition, 5109.
- Standard fire wall, 5108.
- Standard fire window, 5111.
- Standing room in theater and assembly halls, 5506.
- Standpipes.
  - Apartment houses, hotels, etc., 5726.
  - Exterior, 5130.
  - Factories, office buildings, etc., 5411
  - Hospitals, convents, asylums, jails, etc., 5726.
  - Interior, 5134.
  - Schools, libraries, etc., 5621.
  - Theaters, assembly halls, etc., 5533.
- Steam pipes, protection of, 5214.
- Steel construction, allowable stresses, 5316.
- Steel partitions, 5318, 5112.
- Steel, reinforcing, 5313-5314.
- Steel structure, requirements, 5316.
- Stone facing, 5307.
- Stone walls, construction, 5306.
- Stores, etc., (See Factories).
- Stories, number of, 5105.
- Stoves, 5210-5219.
- Street, definition of, 5107.
- Stresses in concrete, 5313.
- Stresses in masonry, 5303.
- Stresses in steel and iron, 5316.
- Stresses in wood, 5317.
- Structural design (all buildings), 5300-5320.

- Thickness of walls, 5304-5310, 5315, 5108.
- Tile, hollow, requirement for, 5331.

- Tile, hollow, walls, 5333.
- Timber construction, 5317-5320.
- Toilet rooms,
  - Apartment houses, hotels, etc., 5722.
  - Cleanliness, etc., 5264, 5265.
  - Compartment doors, 5259.
  - Factories, office buildings, etc., 2203 (page 80).
  - Fixtures, 5260.
  - Floor construction, 5257.
  - General requirement, 5250.
  - Hospitals. convents, asylums, jails, etc., 5722.
  - Light, 5253, 5255.
  - Location, 5253, 5254.
  - Outdoor toilets, 5263.
  - Partitions between fixtures, 5259.
  - Permit for special toilets, 5262.
  - Schools, 5618.
  - Sex segregation, 5251, 5252.
  - Size, 5256.
  - Theaters. assembly halls, etc., 5532.
  - Urinals, 2553, 5259, 5260.
  - Ventilation, 5253, 5254.
  - Walls and ceiling, construction, 5258.
- Tenement house law (page 113).
- Tenement houses, (See Apartment houses).
- Terra Cotta facing, 5307.
- Theaters and assembly halls.
  - Aisles, 5514, 5517.
  - Assembly hall over garages, 5505.
  - Automatic sprinklers, 5535, 5136.
  - Balcony construction, 5502, 5503.
  - Boiler and furnace rooms, fire prevention, 5527, 5210-5217.
  - Capacity. 5506.
  - Chimneys, 5218-5223.
  - Construction, restrictions, 5502, 5503.
  - Design, 5200, 5300-5320.
  - Dressing rooms, etc., 5526.
  - Elevators, 5518. (See Elevator Code).
  - Exit doors, 5511, 5132.
  - Exit lights, 5530, 5531.
  - Exits, number and location, 5507.
  - Exits, required total width, 5512.
  - Exits, type of, 5508.
  - Exposure and courts, 5504.
  - Fire alarm 5536.
  - Fire escapes. 5510. 5121-5131
  - Fire extinguishers, 5534, 5135.
  - Fireproof curtain, 5521.
  - Footlight trough, 5524.
  - Gallery construction, 5502, 5503.
  - Heating. 5528.
  - Height, limit of, 5502, 5503.
  - Inclines, 5516.
  - Lighting, 5529. 5224, 5225.
  - Mirrors, etc., 5537.
  - Motion picture machine booth, 5538-5546.
  - Passageways, etc.. 5515. 5517.
  - Plans, approval of 5008.
  - Proscenium wall, 5520.
  - Seats, 5513.
  - Separation from other portions of building, 5505.
  - Sleeping room over, 5505.
  - Stage, 5519-5526.
  - Stage ventilator, automatic, 5522.
  - Stairways, 5509.
  - Standpipes, 5533. 5130. 5134.
  - Toilet rooms. 5532, 5250-5265.
  - Ventilating, 5528.
  - Window cleaners safety device, 56 (page 61).
- Trap doors, etc., in factories, 5409.
- Urinals. (See Toilet rooms).
- Ventilating flues,
  - General requirements, all buildings, 5217.
  - Schools, 5619, 5217.
- Ventilation,
  - Apartment houses, hotels, etc., 5721.
  - Convents. 5721.
  - Dry cleaning establishments, 5235.
  - Hospitals. convents, asylums, jails, etc., 5721.
  - Schools. libraries. etc., 5619.
  - Theaters, assembly halls, etc. 5528.
  - Toilet rooms, 5253.

Village regulations, 5007.

Walls thickness of, 5303-5310, 5315, 5108.
Warehouses, (See Factories, etc.).
Window cleaners safety device, 56 (page 61)
Windows,
    Apartment houses, hotels, 5719, 5203.
    Division walls, 5202.
    Dry cleaning establishments, 5235, 5203.
    General requirements, 5203.
    Hospitals, convents, asylums, jails, etc., 5719, 5203
    Schools, 5609.
    Toilet rooms, 5253.
Wind pressure on chimneys, 5223.
Wind pressure on buildings, 5301.
Wired glass, 5108, 5109, 5111, 5112.
Wiring, electric, 5225.
Wood construction, allowable stresses, 5317.
Wood construction, requirements, 5317.

THIS BOOK IS DUE ON THE LAST DATE
STAMPED BELOW

AN INITIAL FINE OF 25 CENTS

WILL BE ASSESSED FOR FAILURE TO RETURN THIS BOOK ON THE DATE DUE. THE PENALTY WILL INCREASE TO 50 CENTS ON THE FOURTH DAY AND TO $1.00 ON THE SEVENTH DAY OVERDUE.

MAY 20 1947

LD 21-100m-12,'43 (8796s)

YC 69058

M76413 TH224
W6A25
1914-27

THE UNIVERSITY OF CALIFORNIA LIBRARY